CAD Standards

Boston Transportation Department

February 2010

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BTD Signs

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Chapter One

Introduction

Purpose of the Manual

This manual provides Computer Aided Design (CAD) standards and guidelines in use by the Boston Transportation Department (BTD) in the design and drafting of various engineering plans for projects in the City of Boston. This manual also serves as a guideline for consultants performing design work for BTD. Because of the rapidly changing technologies used in engineering design and drafting, this manual should be considered a "living" document that will change as technologies change and updates may be provided from time to time.

Scope

This manual covers the basic preparation of project plans using CAD methodology. Elements covered are the CAD system, project initiation, drawing file directory structure, file naming conventions, drawing setup, drafting procedures, layers, line types and colors, annotation, hatching, symbols, pen weights, and plotting procedures.

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Chapter Two

The BTD CAD System

Software Applications and Versions

The Boston Transportation Department uses Autodesk's AutoCAD LT 2009. AutoCAD LT provides full DWG native file format compatibility. AutoCAD LT 2009 is compatible with all previous versions of AutoCAD LT and AutoCAD software. AutoCAD LT 2009 software is built with the same technology as AutoCAD 2009, so sharing data is seamless. It also has a built-in "Save As" function to and from releases using the 98, 2000, and 2004 DWG formats. All electronic files delivered to BTD shall be saved in a way so that it may be opened with this version of AutoCAD LT.

Note that AutoCAD LT does not support LISP routines and for this reason is not compatible with many third-party add-on software packages such as AutoTurn or GuideSign.

Any electronic documents submitted to BTD shall be in AutoCAD 2007 format or earlier.

Software Customization

The AutoCAD LT 2009 environment for BTD has been customized to provide optimum ease of use and productivity. By making use of these features, creating and modifying drawings will be consistent and meet BTD guidelines.

Tool Palette

The tool palette makes inserting blocks much easier. The tool palette automatically updates to contain the newest blocks and can be attached to the CAD environment or minimized to create a larger workspace.

BTD Color Table Style

The BTD color table file (BTD.ctb) has been created to ensure consistently clean legible copies of drawing files. The attached sample sheet illustrates the color and line weight of the colors listed. Any color not included in the chart will print out in the color as it appears on-screen.

Network Files (Symbols and Templates)

While AutoCAD LT has been installed locally on each workstation, several pieces of the BTD standard documents will be placed on the network to allow access to the latest updates by all. These include custom BTD cutsheets and blocks, as well as BTD's standard color table file (ctb file).The network location of these files is yet to be determined, but for individual workstations the location of these files will be as follows:

Cutsheets	C:\ ACAD\ TEMPLATES\ *.DWT
Blocks	C:\ ACAD\ BLOCKS\ BTD MASTER.DWG
CTB file	C:\ ACAD\ PLOT SETTINGS\ *.CTB

Chapter Three

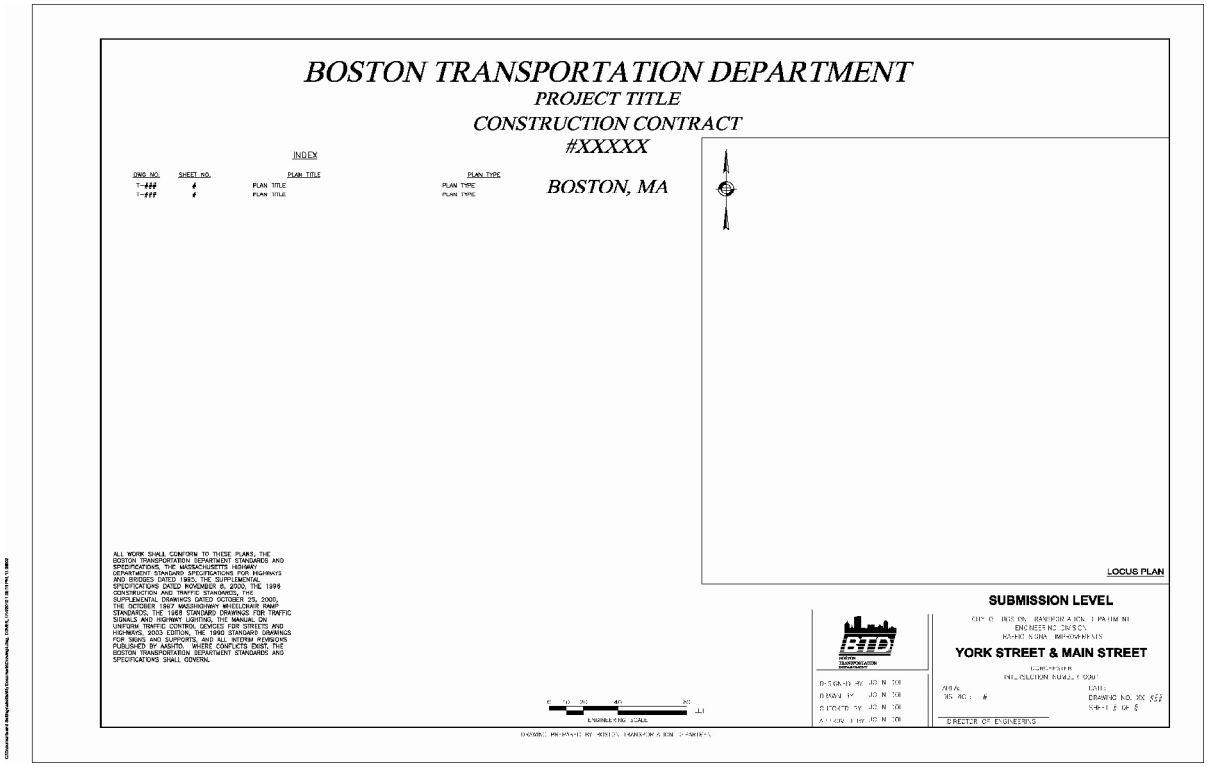
Custom BTD Cutsheets and Blocks

BTD has established that the following sheet templates shall be used for submissions to BTD. This consistency will allow for easier review and understanding of the drawings.

BTD Cover Sheet

The cover sheet (shown in **Figure 1)** includes a locus plan of the site, a drawing index, the project title, and the contract number. The outer border is 34" x 22". When plotting this sheet at half size, the next border in should be selected. This margin will print 1:2 on 17" x 11" printers.

Figure 1. BTD Cover Sheet



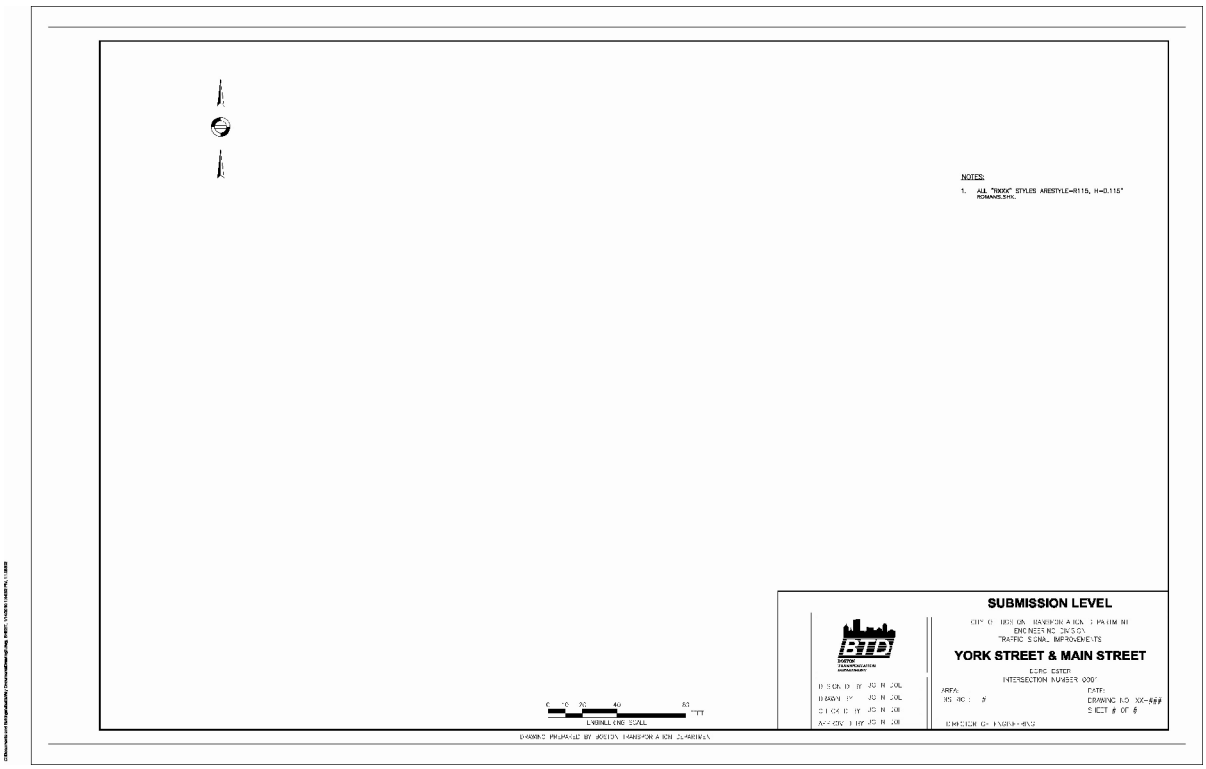
BTD Engineering Cutsheets

The standard cutsheet shown in **Figure 2** has several uses. It will be the base for the following plan types:

- General Notes and Legend;
- Traffic Management Plan;
- Traffic Signal Plan;
- Pavement Marking and Signage Plan; and
- Special Details Plan.

The outer border is 34" x 22". When plotting this sheet at half size, the next border in should be selected. This margin will print 1:2 on 17" x 11" printers.

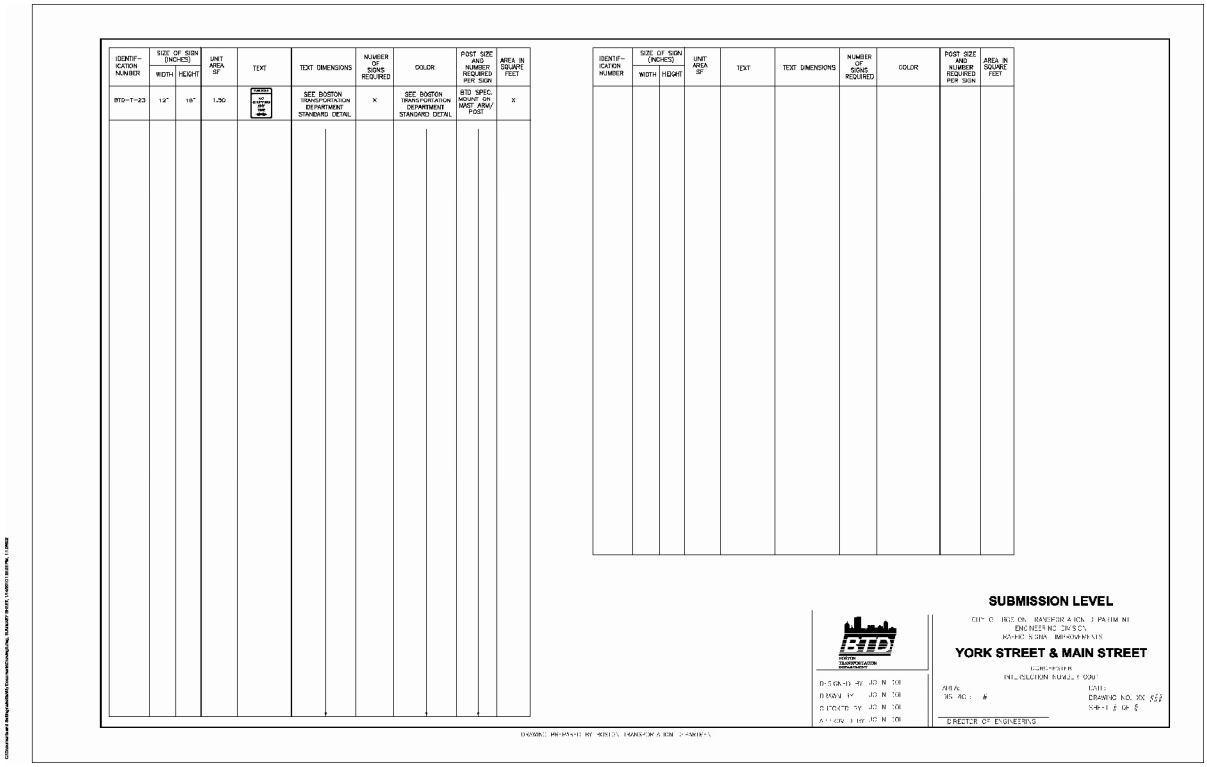
Figure 2. BTD Engineering Cutsheet



BTD Sign Summary Sheet

Sign callouts, dimensions, and descriptions are placed on this sheet (shown in **Figure 3).** All signs must be in alphabetical order. The outer border is 34" x 22". When plotting this sheet at half size, the next border in should be selected. This margin will print 1:2 on 17" x 11" printers.

Figure 3. BTD Sign Summary Sheet



BTD Timing and Phasing Sheets

The signal schedule contains the signal timings, major items list, phase diagrams, and signal faces of a signalized intersection. There are two types of timing and phasing sheets. The BTD timing and phasing sheet for 5 phases template, as shown in **Figure 4,** should be used when designing an intersection comprising **5 phases** or fewer**.** The BTD timing and phasing sheet for **8 phases** template, as shown in **Figure 5,** should be used when designing an intersection comprising 8 phases**.** The BTD intersection number shall be placed in the title block. The outer border is 34" x 22". When plotting this sheet at half size, the next border in should be selected. This margin will print 1:2 on 17" x 11" printers.

Figure 4. Timing and Phasing Sheet for 5 Phases

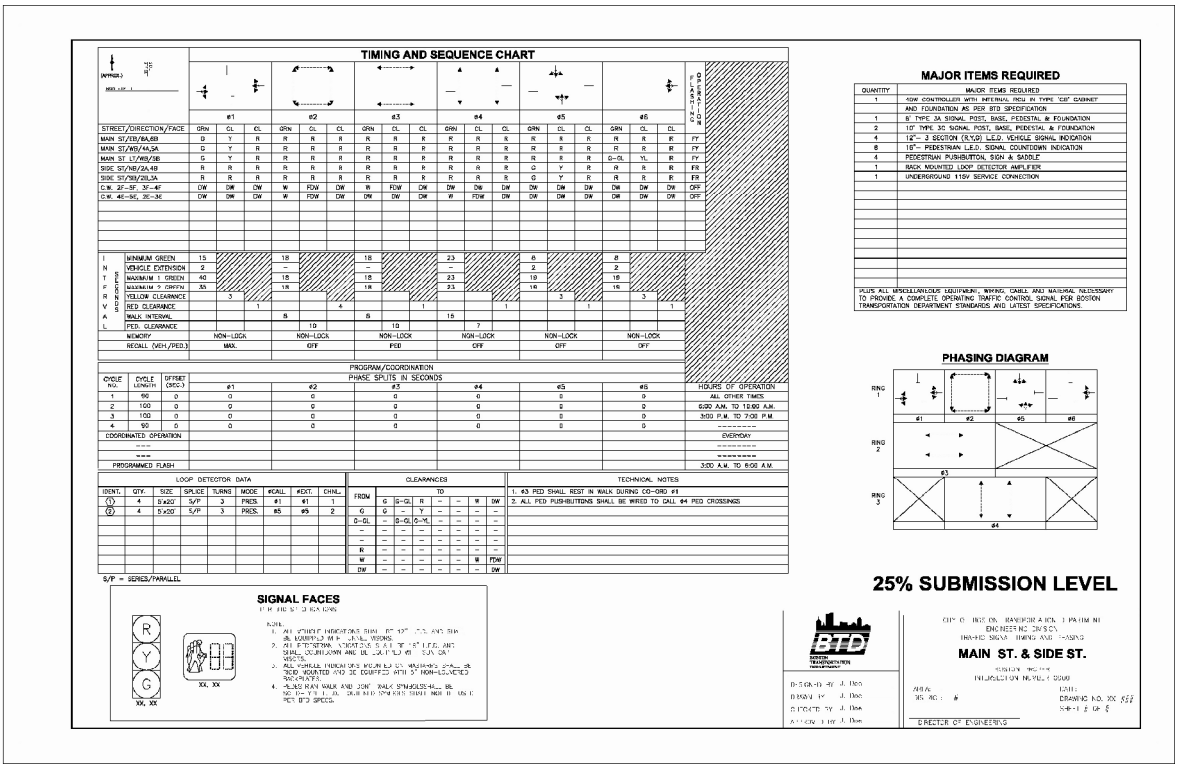
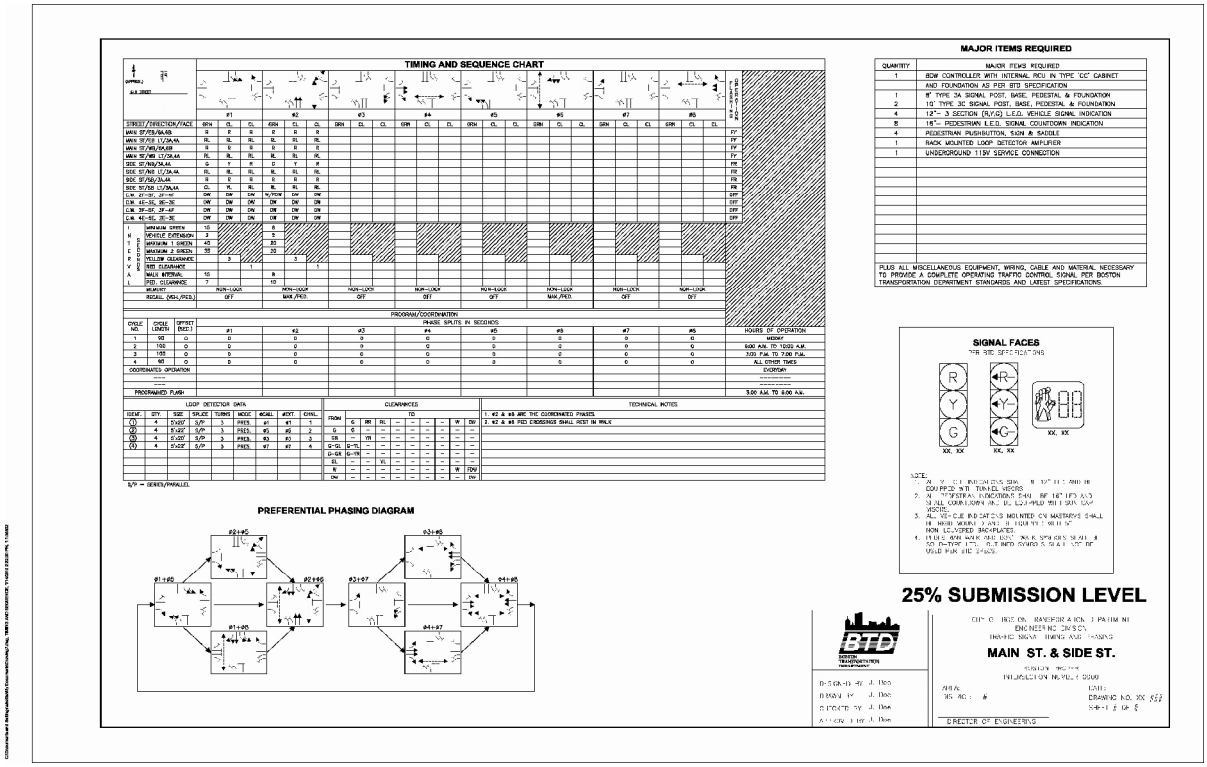


Figure 5. Phasing and Timing Sheet for 8 Phases



BTD Detail Sheets

The following three sheets are to be used for details or illustrations: two 8.5" x 11" sheets (portrait and landscape) and one 17" x 11" sheet, as shown in **Figure 6** through **Figure 8.**

Figure 6. Detail Sheet—Portrait

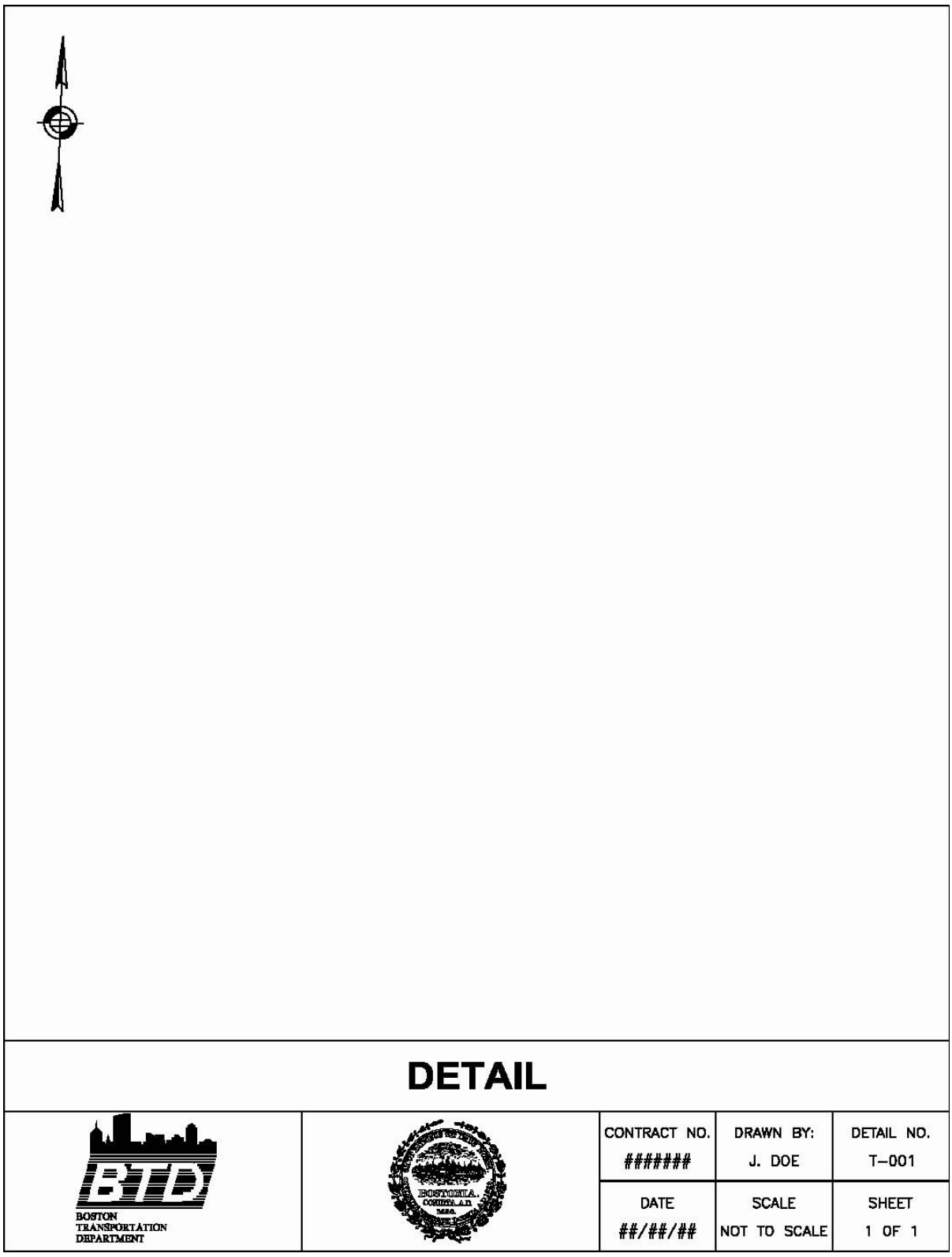


Figure 7. Detail Sheet—Landscape

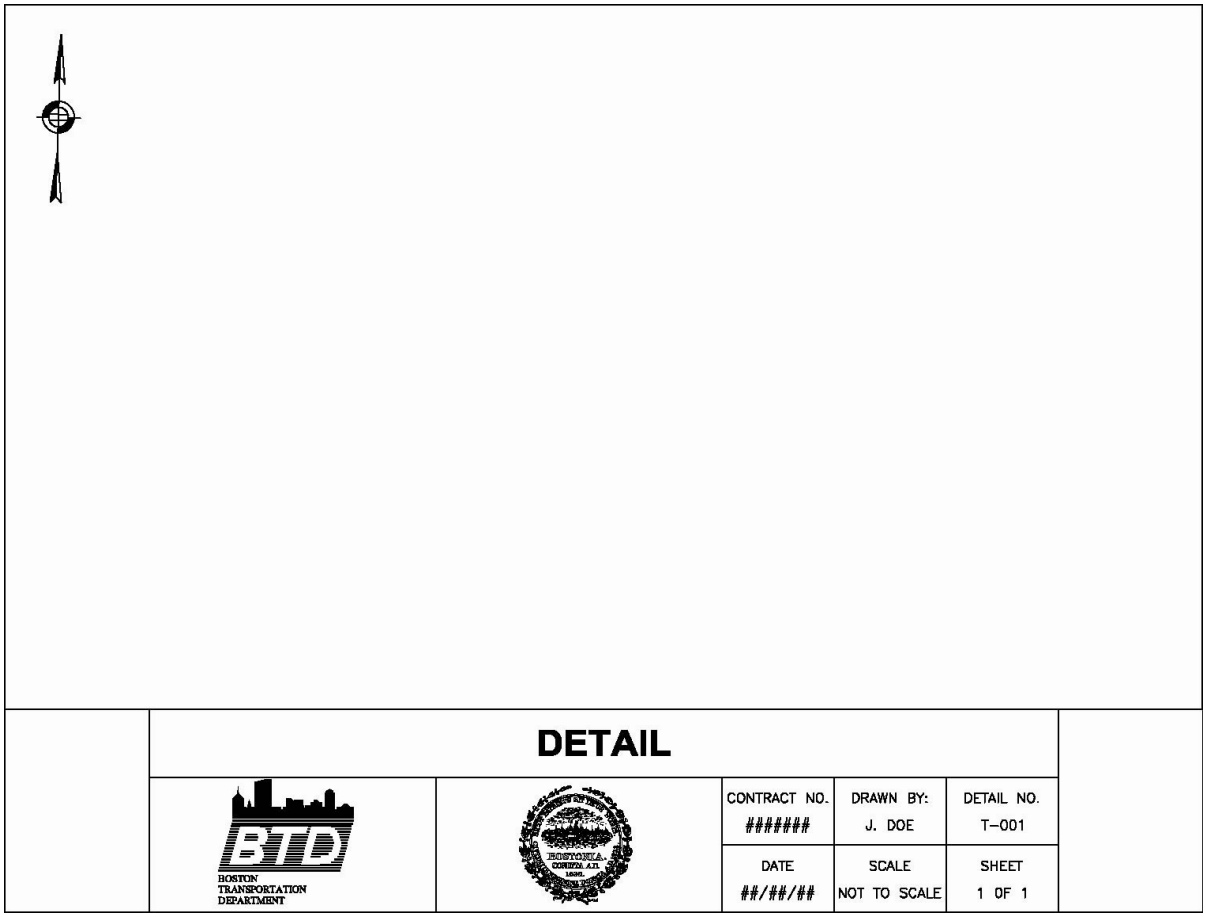
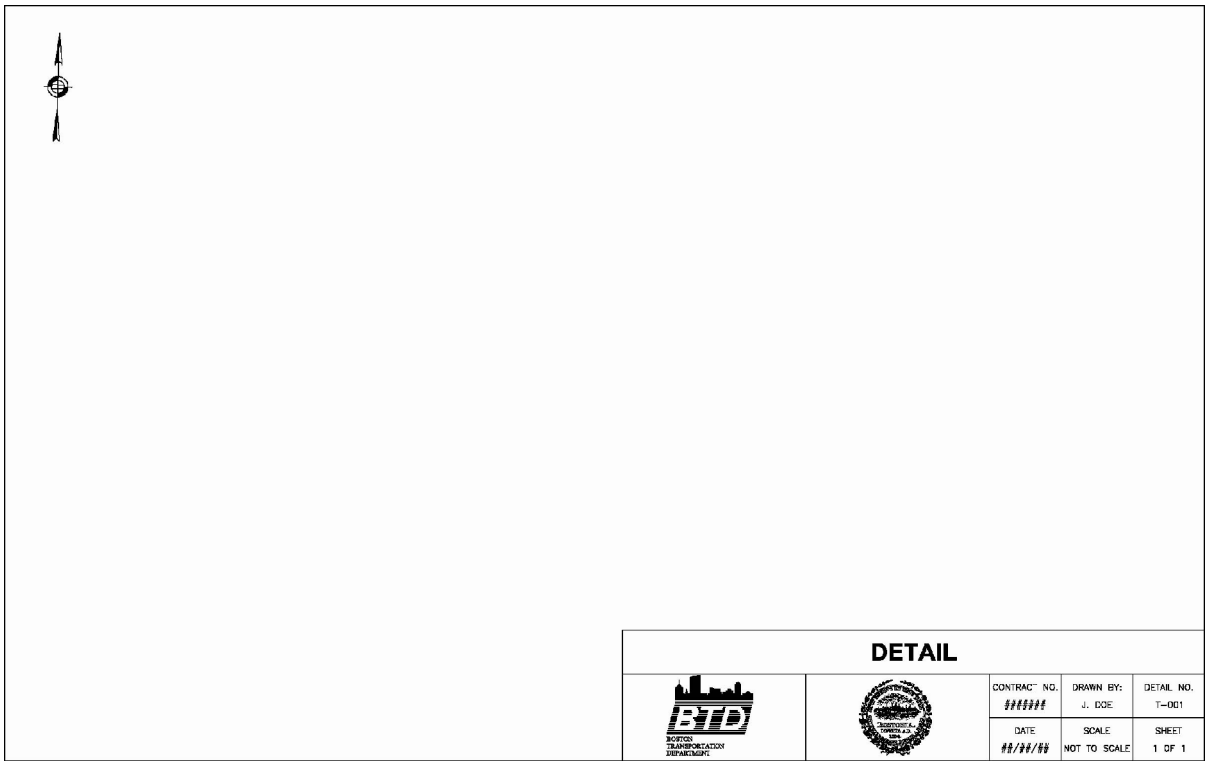


Figure 8. Detail Sheet—17" x 11"



Standard Blocks

A library of standard blocks has been compiled. The inserted blocks will fall in at the correct scale and the color and linetype assigned by the layer. Among the custom blocks are traffic pavement symbols, street furniture, construction equipment, signal equipment, cutsheet annotations, and sign symbols (from BTD and the *Manual on Uniform Traffic Control Devices* [M.U.T.C.D]).

These standard blocks are located on the network for all to access and will be updated on occasion (see **Appendix B** through **Appendix F).**

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Chapter Four

Project Planning and Setup

Project-specific Standards

The standards described shall be applicable to the majority of BTD projects. At times, however, the designer may wish to vary from these standards—for example, for the completion of a project that was started before the implementation of these standards. In cases where the use of these standards would require a significant amount of re-work, the project specific standards are acceptable.

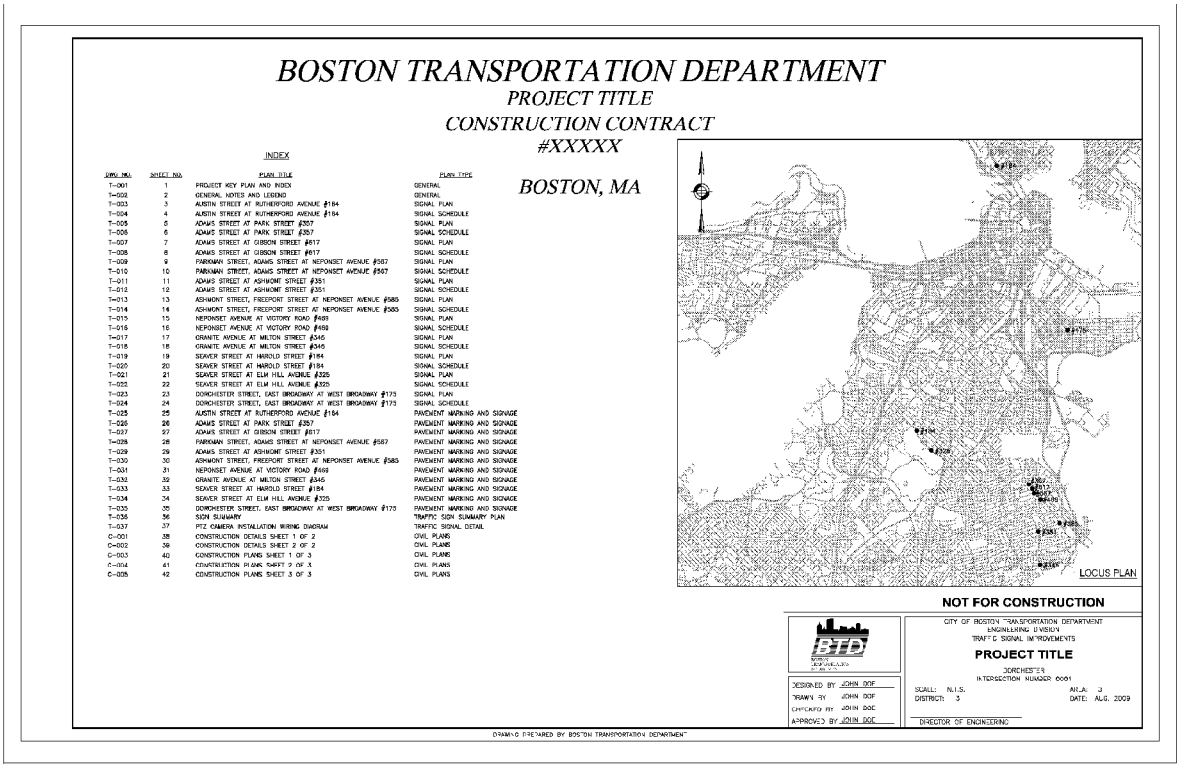
All drawings should be marked "NOT FOR CONSTRUCTION" until a final, stamped submission set or drawing is completed after the proper BTD approvals. When the drawing has reached final design and can be stamped by a registered P.E. in Massachusetts, the drawing should be marked "ISSUED FOR CONSTRUCTION."

Title Sheet and General Notes and Legends

The BTD title sheet is not needed on every project. It shall be used when creating a package that includes multiple intersections, schedules, and details. A drawing index lists the drawing number, sheet number, plan title, and plan type/ description.

The title sheet also contains a locus map, which should show an area with a radius of at least a quarter of a mile around the project site. It should include annotations calling out the project site(s) as well as major landmarks and thoroughfares, as shown in **Figure 9.**

Figure 9. Title Sheet



BOSTON TRANSPORTATION DEPARTMENT

PROJECT TITLE

CONSTRUCTION CONTRACT

#XXXXX

BOSTON, MA

INDEX

DWG. NO.	SHEET NO.	PLAN TITLE	PLAN TYPE
T-001	1	PROJECT KEY PLAN AND INDEX	GENERAL
T-002	2	GENERAL NOTES AND LEGEND	GENERAL
T-003	3	AUSTIN STREET AT RUTHERFORD AVENUE #184	SIGNAL PLAN
T-004	4	AUSTIN STREET AT RUTHERFORD AVENUE #184	SIGNAL SCHEDULE
T-005	5	ADAMS STREET AT PARK STREET #357	SIGNAL PLAN
T-006	6	ADAMS STREET AT PARK STREET #357	SIGNAL SCHEDULE
T-007	7	ADAMS STREET AT GIBSON STREET #617	SIGNAL PLAN
T-008	8	ADAMS STREET AT GIBSON STREET #617	SIGNAL SCHEDULE
T-009	9	FARNHAM STREET, ADAMS STREET AT NEPONSET AVENUE #587	SIGNAL PLAN
T-010	10	FARNHAM STREET, ADAMS STREET AT NEPONSET AVENUE #587	SIGNAL SCHEDULE
T-011	11	ADAMS STREET AT ASHMONT STREET #351	SIGNAL PLAN
T-012	12	ADAMS STREET AT ASHMONT STREET #351	SIGNAL SCHEDULE
T-013	13	ASHMONT STREET, FREEPORT STREET AT NEPONSET AVENUE #585	SIGNAL PLAN
T-014	14	ASHMONT STREET, FREEPORT STREET AT NEPONSET AVENUE #585	SIGNAL SCHEDULE
T-015	15	NEPONSET AVENUE AT VICTORY ROAD #469	SIGNAL PLAN
T-016	16	NEPONSET AVENUE AT VICTORY ROAD #469	SIGNAL SCHEDULE
T-017	17	GRANITE AVENUE AT MILTON STREET #345	SIGNAL PLAN
T-018	18	GRANITE AVENUE AT MILTON STREET #345	SIGNAL SCHEDULE
T-019	19	SEAVER STREET AT HAROLD STREET #184	SIGNAL PLAN
T-020	20	SEAVER STREET AT HAROLD STREET #184	SIGNAL SCHEDULE
T-021	21	SEAVER STREET AT ELM HILL AVENUE #325	SIGNAL PLAN
T-022	22	SEAVER STREET AT ELM HILL AVENUE #325	SIGNAL SCHEDULE
T-023	23	DORCHESTER STREET, EAST BROADWAY AT WEST BROADWAY #173	SIGNAL PLAN
T-024	24	DORCHESTER STREET, EAST BROADWAY AT WEST BROADWAY #173	SIGNAL SCHEDULE
T-025	25	AUSTIN STREET AT RUTHERFORD AVENUE #184	PAVEMENT MARKING AND SIGNAGE
T-026	26	ADAMS STREET AT PARK STREET #357	PAVEMENT MARKING AND SIGNAGE
T-027	27	ADAMS STREET AT GIBSON STREET #617	PAVEMENT MARKING AND SIGNAGE
T-028	28	FARNHAM STREET, ADAMS STREET AT NEPONSET AVENUE #587	PAVEMENT MARKING AND SIGNAGE
T-029	29	ADAMS STREET AT ASHMONT STREET #351	PAVEMENT MARKING AND SIGNAGE
T-030	30	ASHMONT STREET, FREEPORT STREET AT NEPONSET AVENUE #585	PAVEMENT MARKING AND SIGNAGE
T-031	31	NEPONSET AVENUE AT VICTORY ROAD #469	PAVEMENT MARKING AND SIGNAGE
T-032	32	GRANITE AVENUE AT MILTON STREET #345	PAVEMENT MARKING AND SIGNAGE
T-033	33	SEAVER STREET AT HAROLD STREET #184	PAVEMENT MARKING AND SIGNAGE
T-034	34	SEAVER STREET AT ELM HILL AVENUE #325	PAVEMENT MARKING AND SIGNAGE
T-035	35	DORCHESTER STREET, EAST BROADWAY AT WEST BROADWAY #173	PAVEMENT MARKING AND SIGNAGE
T-036	36	SIGN SUMMARY	TRAFFIC SIGN SUMMARY PLAN
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C-001	38	CONSTRUCTION DETAILS SHEET 1 OF 2	CIVIL PLANS
C-002	39	CONSTRUCTION DETAILS SHEET 2 OF 2	CIVIL PLANS
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C-005	42	CONSTRUCTION PLANS SHEET 3 OF 3	CIVIL PLANS

LOCUS PLAN

NOT FOR CONSTRUCTION

CITY OF BOSTON TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION
TRAFFIC SIGNAL IMPROVEMENTS

PROJECT TITLE

DORCHESTER
INTERSECTION NUMBER 6661

DESIGNED BY JOHN DOE
DRAWN BY JOHN DOE
CHECKED BY JOHN DOE
APPROVED BY JOHN DOE

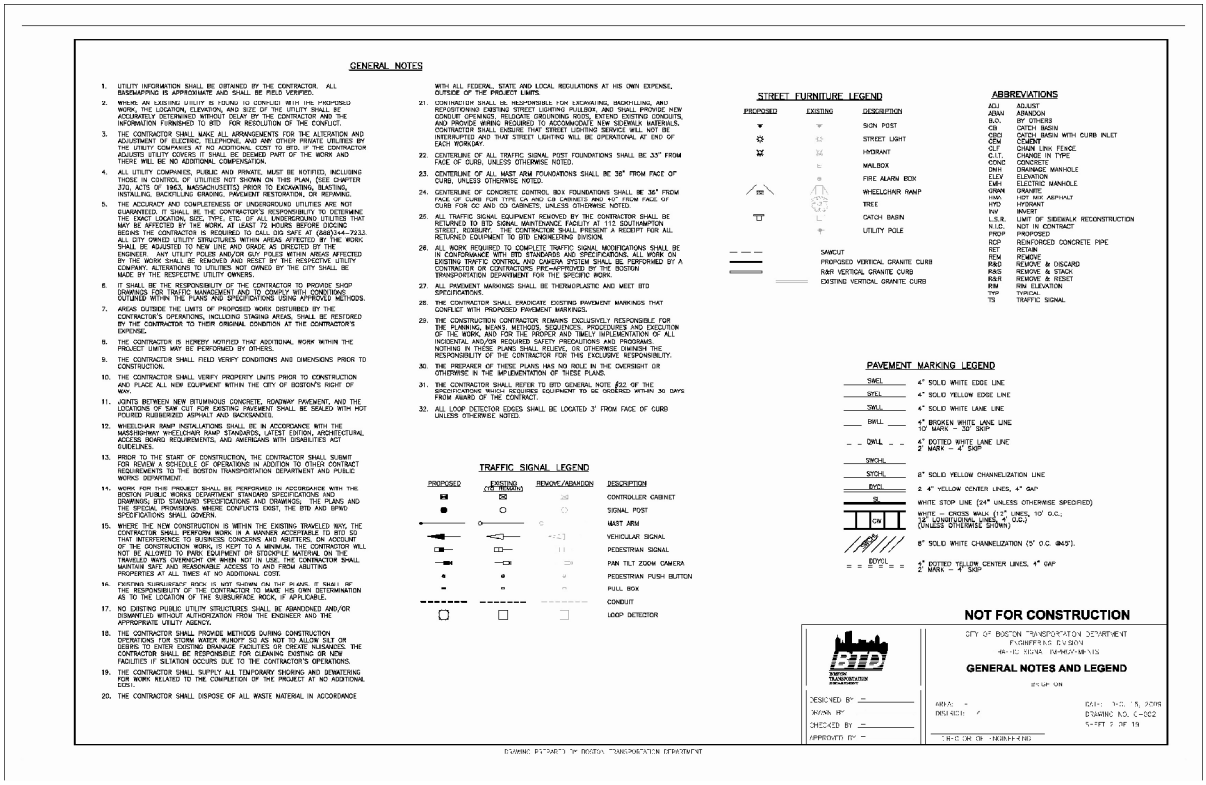
SCALE: N.I.S.
DISTRICT: 3
AREA: 3
DATE: AUG. 2009

DIRECTOR OF ENGINEERING

DRAWING PREPARED BY BOSTON TRANSPORTATION DEPARTMENT

The general notes and legend sheet contains any project-wide notes and a legend of all symbols, abbreviations, and linetypes used in the drawing set (see **Figure 10).**

Figure 10. General Notes



GENERAL NOTES

1. UTILITY INFORMATION SHALL BE OBTAINED BY THE CONTRACTOR. ALL BASEMAPPING IS APPROXIMATE AND SHALL BE FIELD VERIFIED.
2. WHERE AN EXISTING UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION, AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR AND THE INFORMATION FURNISHED TO BTD FOR RESOLUTION OF THE CONFLICT.
3. THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS FOR THE ALTERATION AND ADJUSTMENT OF ELECTRIC, TELEPHONE, AND ANY OTHER PRIVATE UTILITIES BY THE UTILITY COMPANIES AT NO ADDITIONAL COST TO BTD. IF THE CONTRACTOR ADJUSTS UTILITY COVERS IT SHALL BE DEEMED PART OF THE WORK AND THERE WILL BE NO ADDITIONAL COMPENSATION.
4. ALL UTILITY COMPANIES, PUBLIC AND PRIVATE, MUST BE NOTIFIED, INCLUDING THOSE IN CONTROL OF UTILITIES NOT SHOWN ON THIS PLAN, (SEE CHAPTER 320, ACTS OF 1963, MASSACHUSETTS) PRIOR TO EXCAVATING, BLASTING, INSTALLING BACKFILLING REMOVING, PAVEMENT RESTORATION, OR REPAVING.
5. THE ACCURACY AND COMPLETENESS OF UNDERGROUND UTILITIES ARE NOT GUARANTEED. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT LOCATION, SIZE, TYPE, ETC. OF ALL UNDERGROUND UTILITIES THAT MAY BE AFFECTED BY THE WORK, AT LEAST 72 HOURS BEFORE DIGGING BEGINS THE CONTRACTOR IS REQUIRED TO CALL DIG SAFE AT (888)344-7233. ALL CITY OWNED UTILITY STRUCTURES WITHIN AREAS AFFECTED BY THE WORK SHALL BE ADJUSTED TO NEW LINE AND GRADE AS DIRECTED BY THE ENGINEER. ANY UTILITY POLES AND/OR GUY POLES WITHIN AREAS AFFECTED BY THE WORK SHALL BE REMOVED AND RESET BY THE RESPECTIVE UTILITY COMPANY. ALTERATIONS TO UTILITIES NOT OWNED BY THE CITY SHALL BE MADE BY THE RESPECTIVE UTILITY OWNERS.
6. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE SHOP DRAWINGS FOR TRAFFIC MANAGEMENT AND TO COMPLY WITH CONDITIONS OUTLINED WITHIN THE PLANS AND SPECIFICATIONS USING APPROVED METHODS.
7. AREAS OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY THE CONTRACTOR'S OPERATIONS, INCLUDING STAGING AREAS, SHALL BE RESTORED BY THE CONTRACTOR TO THEIR ORIGINAL CONDITION AT THE CONTRACTOR'S EXPENSE.
8. THE CONTRACTOR IS HEREBY NOTIFIED THAT ADDITIONAL WORK WITHIN THE PROJECT LIMITS MAY BE PERFORMED BY OTHERS.
9. THE CONTRACTOR SHALL FIELD VERIFY CONDITIONS AND DIMENSIONS PRIOR TO CONSTRUCTION.
10. THE CONTRACTOR SHALL VERIFY PROPERTY LINITS PRIOR TO CONSTRUCTION AND PLACE ALL NEW EQUIPMENT WITHIN THE CITY OF BOSTON'S RIGHT OF WAY.
11. JOINTS BETWEEN NEW BITUMINOUS CONCRETE, ROADWAY PAVEMENT, AND THE LOCATIONS OF SAW CUT FOR EXISTING PAVEMENT SHALL BE SEALED WITH HOT POURED RUBBERIZED ASPHALT AND BACKSANDED.
12. WHEELCHAIR RAMP INSTALLATIONS SHALL BE IN ACCORDANCE WITH THE MASSHIGHWAY WHEELCHAIR RAMP STANDARDS, LATEST EDITION, ARCHITECTURAL ACCESS BOARD REQUIREMENTS, AND AMERICANS WITH DISABILITIES ACT GUIDELINES.
13. PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR SHALL SUBMIT FOR REVIEW A SCHEDULE OF OPERATIONS IN ADDITION TO OTHER CONTRACT REQUIREMENTS TO THE BOSTON TRANSPORTATION DEPARTMENT AND PUBLIC WORKS DEPARTMENT.
14. WORK FOR THIS PROJECT SHALL BE PERFORMED IN ACCORDANCE WITH THE BOSTON PUBLIC WORKS DEPARTMENT STANDARD SPECIFICATIONS AND DRAWINGS, BTD STANDARD SPECIFICATIONS AND DRAWINGS. THE PLANS AND THE SPECIAL PROVISIONS, WHERE CONFLICTS EXIST, THE BTD AND BPWD SPECIFICATIONS SHALL GOVERN.
15. WHERE THE NEW CONSTRUCTION IS WITHIN THE EXISTING TRAVELED WAY, THE CONTRACTOR SHALL PERFORM WORK IN A MANNER ACCEPTABLE TO BTD SO THAT INTERFERENCE TO BUSINESS CONCERNS AND ABUTTERS, ON ACCOUNT OF THE CONSTRUCTION WORK, IS KEPT TO A MINIMUM. THE CONTRACTOR WILL NOT BE ALLOWED TO PARK EQUIPMENT OR STOCKPILE MATERIAL ON THE TRAVELED WAYS OVERNIGHT OR WHEN NOT IN USE. THE CONTRACTOR SHALL MAINTAIN SAFE AND REASONABLE ACCESS TO AND FROM ABUTTING PROPERTIES AT ALL TIMES AT NO ADDITIONAL COST.
16. EXISTING SUBSURFACE ROCK IS NOT SHOWN ON THE PLANS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO MAKE HIS OWN DETERMINATION AS TO THE LOCATION OF THE SUBSURFACE ROCK, IF APPLICABLE.
17. NO EXISTING PUBLIC UTILITY STRUCTURES SHALL BE ABANDONED AND/OR DISMANTLED WITHOUT AUTHORIZATION FROM THE ENGINEER AND THE APPROPRIATE UTILITY AGENCY.
18. THE CONTRACTOR SHALL PROVIDE METHODS DURING CONSTRUCTION OPERATIONS FOR STORM WATER RUNOFF SO AS NOT TO ALLOW SILT OR DEBRIS TO ENTER EXISTING DRAINAGE FACILITIES OR CREATE NUISANCES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANING EXISTING OR NEW FACILITIES IF SILTATION OCCURS DUE TO THE CONTRACTOR'S OPERATIONS.
19. THE CONTRACTOR SHALL SUPPLY ALL TEMPORARY SIGNING AND DEWATERING FOR WORK RELATED TO THE COMPLETION OF THE PROJECT AT NO ADDITIONAL COST.
20. THE CONTRACTOR SHALL DISPOSE OF ALL WASTE MATERIAL IN ACCORDANCE WITH ALL FEDERAL, STATE AND LOCAL REGULATIONS AT HIS OWN EXPENSE, OUTSIDE OF THE PROJECT LIMITS.
21. CONTRACTOR SHALL BE RESPONSIBLE FOR EXCAVATING, BACKFILLING AND REPOSITIONING EXISTING STREET LIGHTING PULLBOX, AND SHALL PROVIDE NEW CONDUIT, REPAIRING, RELOCATING OR LENGTHENING WIRES, BEYOND EXISTING CONDUITS, AS REQUIRED. WHERE NEW CONDUIT ACCOMMODATES NEW SIGNAL CABLE MATERIALS, CONTRACTOR SHALL ENSURE THAT STREET LIGHTING SERVICE WILL NOT BE INTERRUPTED AND THAT STREET LIGHTING WILL BE OPERATIONAL AT END OF EACH WORKDAY.
22. CENTERLINE OF ALL TRAFFIC SIGNAL POST FOUNDATIONS SHALL BE 33" FROM FACE OF CURB, UNLESS OTHERWISE NOTED.
23. CENTERLINE OF ALL MAST ARM FOUNDATIONS SHALL BE 36" FROM FACE OF CURB, UNLESS OTHERWISE NOTED.
24. CENTERLINE OF CONCRETE CONTROL BOX FOUNDATIONS SHALL BE 36" FROM FACE OF CURB FOR TYPE CA AND CB CABINETS AND 42" FROM FACE OF CURB FOR CC AND CD CABINETS, UNLESS OTHERWISE NOTED.
25. ALL TRAFFIC SIGNAL EQUIPMENT REMOVED BY THE CONTRACTOR SHALL BE RETURNED TO BTD SIGNAL MAINTENANCE FACILITY AT 112 SOUTHAMPTON STREET, ROXBURY. THE CONTRACTOR SHALL PRESENT A RECEIPT FOR ALL RETURNED EQUIPMENT TO BTD ENGINEERING DIVISION.
26. ALL WORK REQUIRED TO COMPLETE TRAFFIC SIGNAL MODIFICATIONS SHALL BE IN CONFORMANCE WITH BTD STANDARDS AND SPECIFICATIONS. ALL WORK ON EXISTING TRAFFIC CONTROL AND CAMERA SYSTEM SHALL BE PERFORMED BY A CONTRACTOR OR CONTRACTORS PRE-APPROVED BY THE BOSTON TRANSPORTATION DEPARTMENT FOR THE SPECIFIC WORK.
27. ALL PAVEMENT MARKINGS SHALL BE THERMOPLASTIC AND MEET BTD SPECIFICATIONS.
28. THE CONTRACTOR SHALL ERADICATE EXISTING PAVEMENT MARKINGS THAT CONFLICT WITH PROPOSED PAVEMENT MARKINGS.
29. THE CONSTRUCTION CONTRACTOR REMAINS EXCLUSIVELY RESPONSIBLE FOR THE PLANNING, MEANS, METHODS, SEQUENCES, PROCEDURES AND EXECUTION OF THE WORK, AND FOR THE PROPER AND TIMELY IMPLEMENTATION OF ALL INCIDENTAL AND/OR REQUIRED SAFETY PRECAUTIONS AND PROGRAMS. NOTHING IN THESE PLANS SHALL RELIEVE, OR OTHERWISE DIMINISH THE RESPONSIBILITY OF THE CONTRACTOR FOR THIS EXCLUSIVE RESPONSIBILITY.
30. THE PREPARER OF THESE PLANS HAS NO ROLE IN THE OVERSIGHT OR OTHERWISE IN THE IMPLEMENTATION OF THESE PLANS.
31. THE CONTRACTOR SHALL REFER TO BTD GENERAL NOTE #32. OF THE SPECIFICATIONS WHICH REQUIRES EQUIPMENT TO BE ORDERED WITHIN 30 DAYS FROM AWARD OF THE CONTRACT.
32. ALL LOOP DETECTOR EDGES SHALL BE LOCATED 3' FROM FACE OF CURB UNLESS OTHERWISE NOTED.

TRAFFIC SIGNAL LEGEND

PROPOSED	EXISTING (TO REMAIN)	REMOVE/ABANDON	DESCRIPTION
■	☒	⊠	CONTROLLER CABINET
●	○	⊘	SIGNAL POST
			MAST ARM
			VEHICULAR SIGNAL
			PEDESTRIAN SIGNAL
			PAN TILT ZOOM CAMERA
			PEDESTRIAN PUSH BUTTON
			PULL BOX
			CONDUIT
			LOOP DETECTOR

STREET FURNITURE LEGEND

PROPOSED	EXISTING	DESCRIPTION
		SIGN POST
		STREET LIGHT
		HYDRANT
		MAILBOX
		FIRE ALARM BOX
		WHEELCHAIR RAMP
		TREE
		CATCH BASIN
		UTILITY POLE
		SAWCUT
		PROPOSED VERTICAL GRANITE CURB
		RAR VERTICAL GRANITE CURB
		EXISTING VERTICAL GRANITE CURB

ABBREVIATIONS

ADJ	ADJUST
ABAN	ABANDON
B.O.	BY OTHERS
CB	CATCH BASIN
CBCI	CATCH BASIN WITH CURB INLET
CEM	CEMENT
CLF	CHAIN LINK FENCE
C.I.T.	CHANGE IN TYPE
CONC	CONCRETE
DMH	DRAINAGE MANHOLE
ELEV	ELEVATION
EMH	ELECTRIC MANHOLE
GRAN	GRANITE
HMA	HOT MIX ASPHALT
HYD	HYDRANT
INV	INVERT
L.S.R.	LIMIT OF SIDEWALK RECONSTRUCTION
N.I.C.	NOT IN CONTRACT
PROP	PROPOSED
RCP	REINFORCED CONCRETE PIPE
RET	RETAIN
REM	REMOVE
R&S	REMOVE & DISCARD
R&S	REMOVE & STACK
R&R	REMOVE & RESET
RIM	RIM ELEVATION
TYP	TYPICAL
TS	TRAFFIC SIGNAL

PAVEMENT MARKING LEGEND

SWEL	4" SOLID WHITE EDGE LINE
SYEL	4" SOLID YELLOW EDGE LINE
SWLL	4" SOLID WHITE LANE LINE
BWLL	4" BROKEN WHITE LANE LINE 10' MARK – 30' SKIP
DWLL	4" DOTTED WHITE LANE LINE 2' MARK – 4' SKIP
SWCHL	
SYCHL	8" SOLID YELLOW CHANNELIZATION LINE
BYCL	2. 4" YELLOW CENTER LINES, 4" GAP
SL	WHITE STOP LINE (24" UNLESS OTHERWISE SPECIFIED)
CW	WHITE – CROSS WALK (12" LINES, 10' O.C.; 24" LONGITUDINAL LINES, 4' O.C.) (UNLESS OTHERWISE SHOWN)
	8" SOLID WHITE CHANNELIZATION (5' O.C. @45°).
BDYCL	4" DOTTED YELLOW CENTER LINES, 4" GAP 2' MARK – 4' SKIP

NOT FOR CONSTRUCTION

CITY OF BOSTON TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION
TRAFFIC SIGNAL IMPROVEMENTS

GENERAL NOTES AND LEGEND

DESIGNED BY –
DRAWN BY –
CHECKED BY –
APPROVED BY –

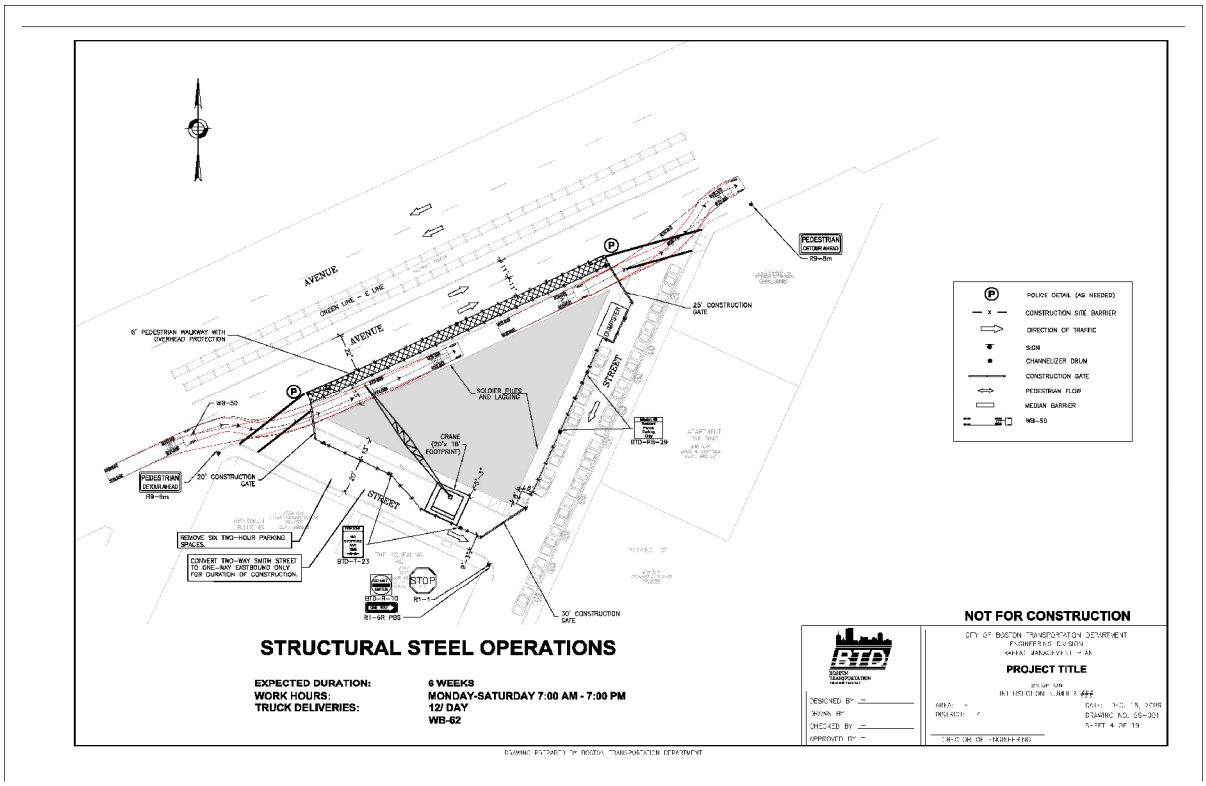
DRAWING NO. C-002
SHEET 2 OF 19

DRAWING PREPARED BY BOSTON TRANSPORTATION DEPARTMENT

Traffic Management Plans

The BTD traffic management plans (placed in the BTD engineering cutsheet as described above) are used to show site existing conditions, how pedestrian and vehicular traffic will be maintained during construction, and proposed changes to an area. Site base maps/ surveys should be externally referenced (xref'd) into the drawings. All traffic management plans shall be submitted at 1"=20'-0". The only exception to this scale shall be when the limits of the work may lend itself to be shown at a smaller scale. In this case, 1"=40'-0" is acceptable. Any real-world objects that will be placed on-site should be drawn in model space, with all annotations done in paper space (see **Figure 11).**

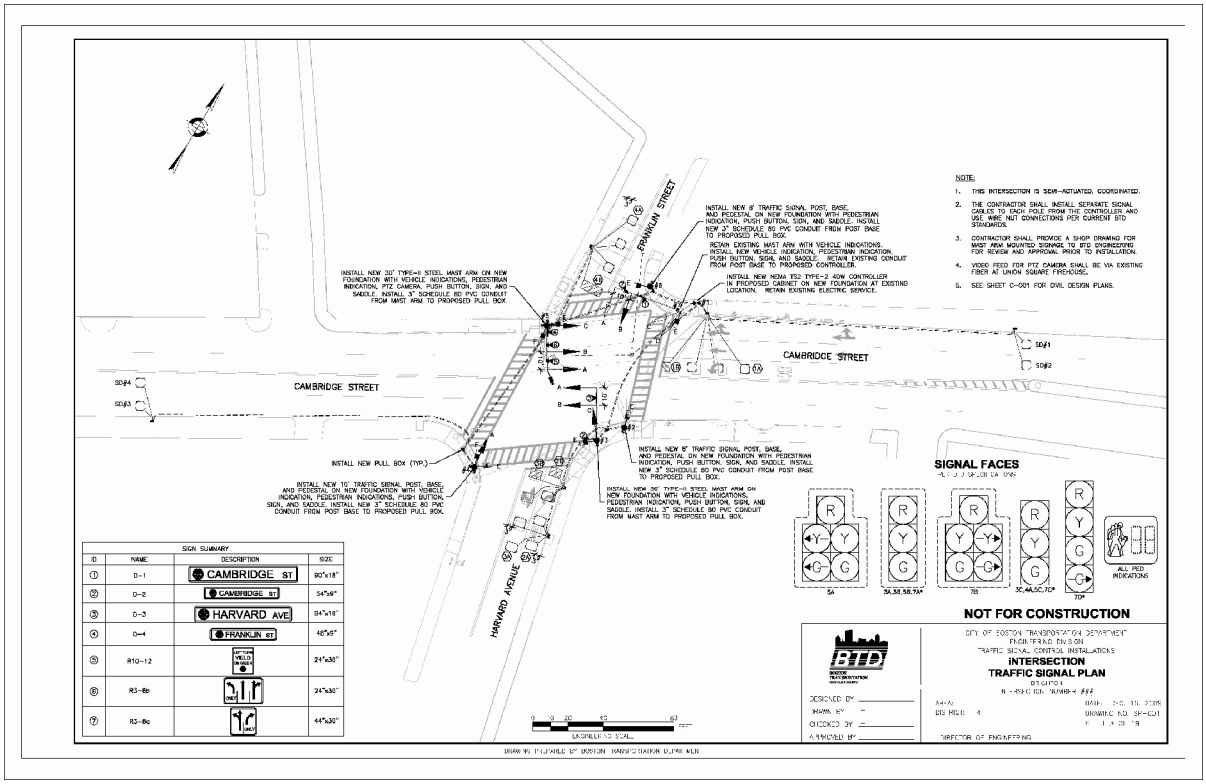
Figure 11. Traffic Management Plan



Traffic Signal Plans

The BTD traffic signal plans (placed in the BTD engineering cutsheet) are used to show the existing signal design, proposed signal design and signal equipment to be removed or retained. Site base maps/ surveys should be xref'd into the drawings in model space. All traffic signal plans shall be submitted at 1"=20'-0". Any real-world objects that will be placed on-site should be drawn in model space, with all annotations done in paper space (see **Figure 12).** Note that signal faces shall be shown on this plan in addition to the Traffic Timing and Phasing Plan. The BTD intersection number shall be placed in the title block.

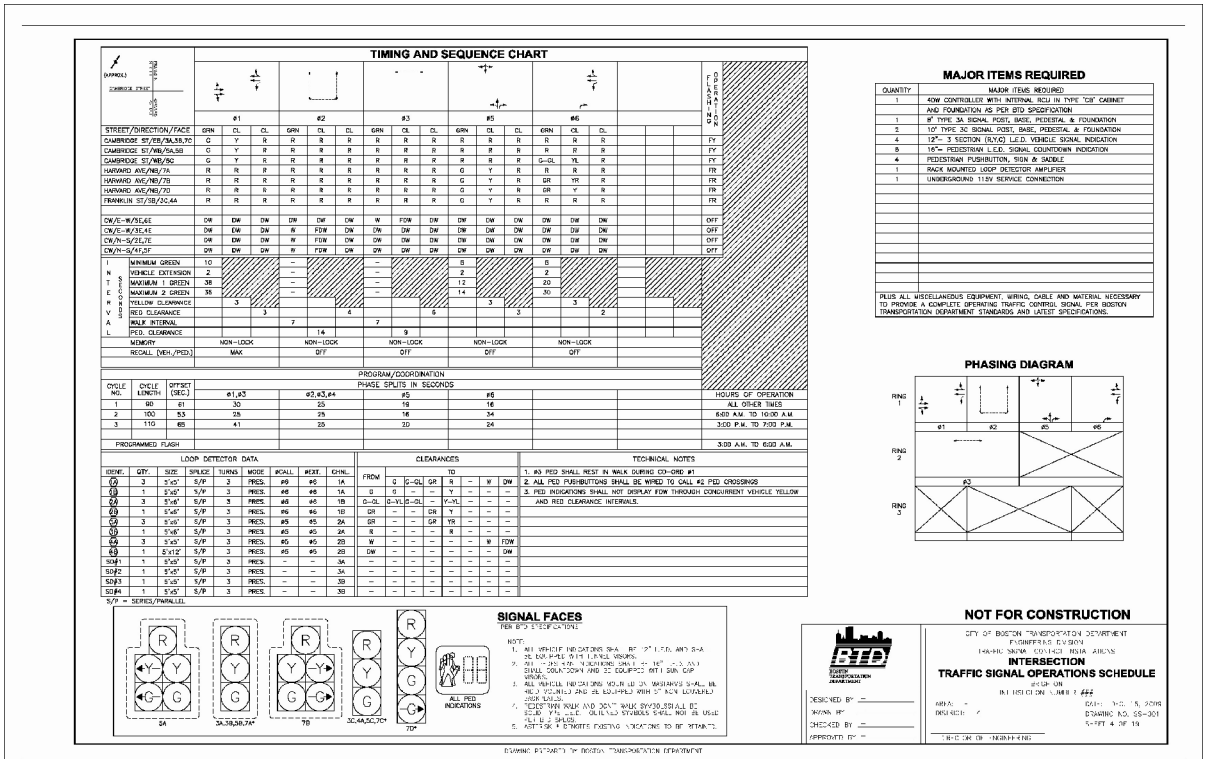
Figure 12. Traffic Signal Plan



Traffic Timing and Phasing Plans

The BTD traffic timing and phasing plans (placed in the BTD timing and phasing cutsheet) show signal timings, major items required at the intersection, a preferential phase diagram, and the signal faces used. The BTD timing and phasing template shall be used for these types of plans (see **Figure 13).** All annotation and symbols are placed in paper space. The BTD intersection number shall be placed in the title block. Model space is not used in Timing and Phasing plans.

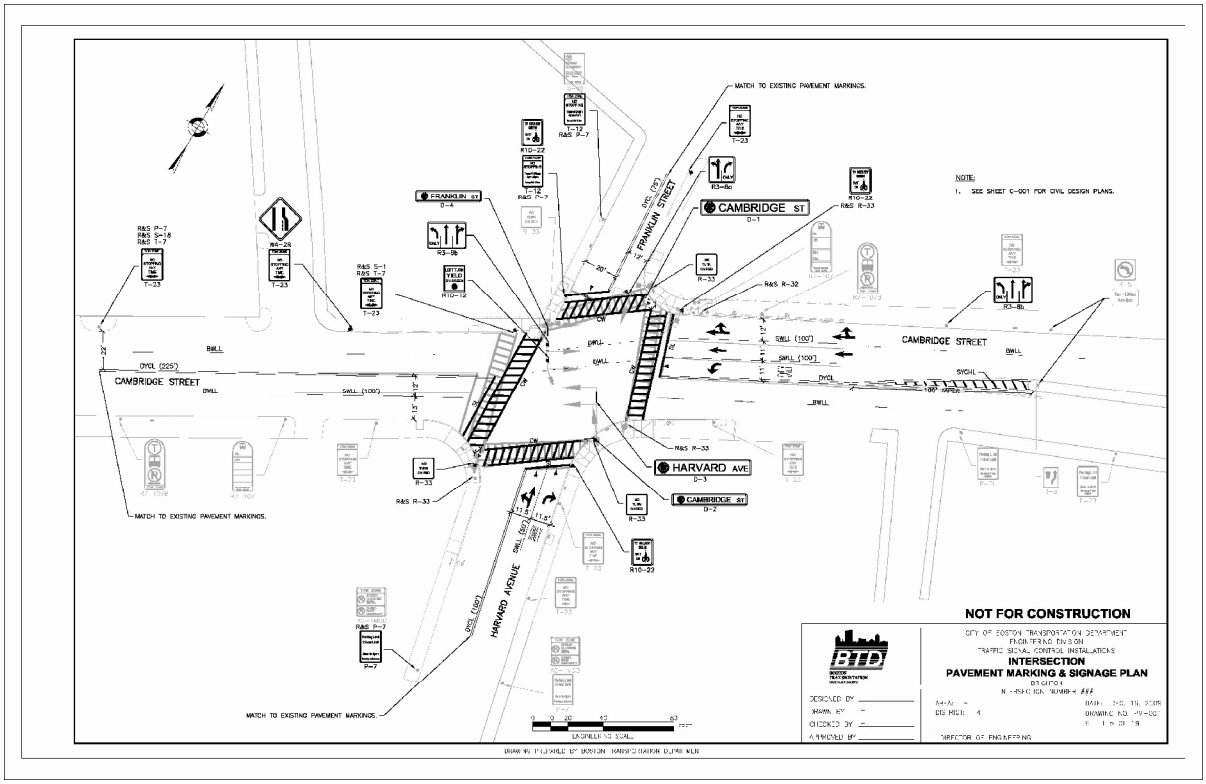
Figure 13. Traffic Timing and Phasing Plan



Pavement Marking and Signage Plans

Pavement marking and signage plans (placed in the BTD engineering cutsheet)are used to show existing site pavement marking and signage conditions, as well as proposed changes to site pavement markings and signage. Site base maps/surveys should be xref'd into the drawings. All traffic management plans shall be submitted at 1"=20'-0". Any real-world objects that will be placed on-site will be drawn in model space, with all annotations done in paper space (see **Figure 14).**

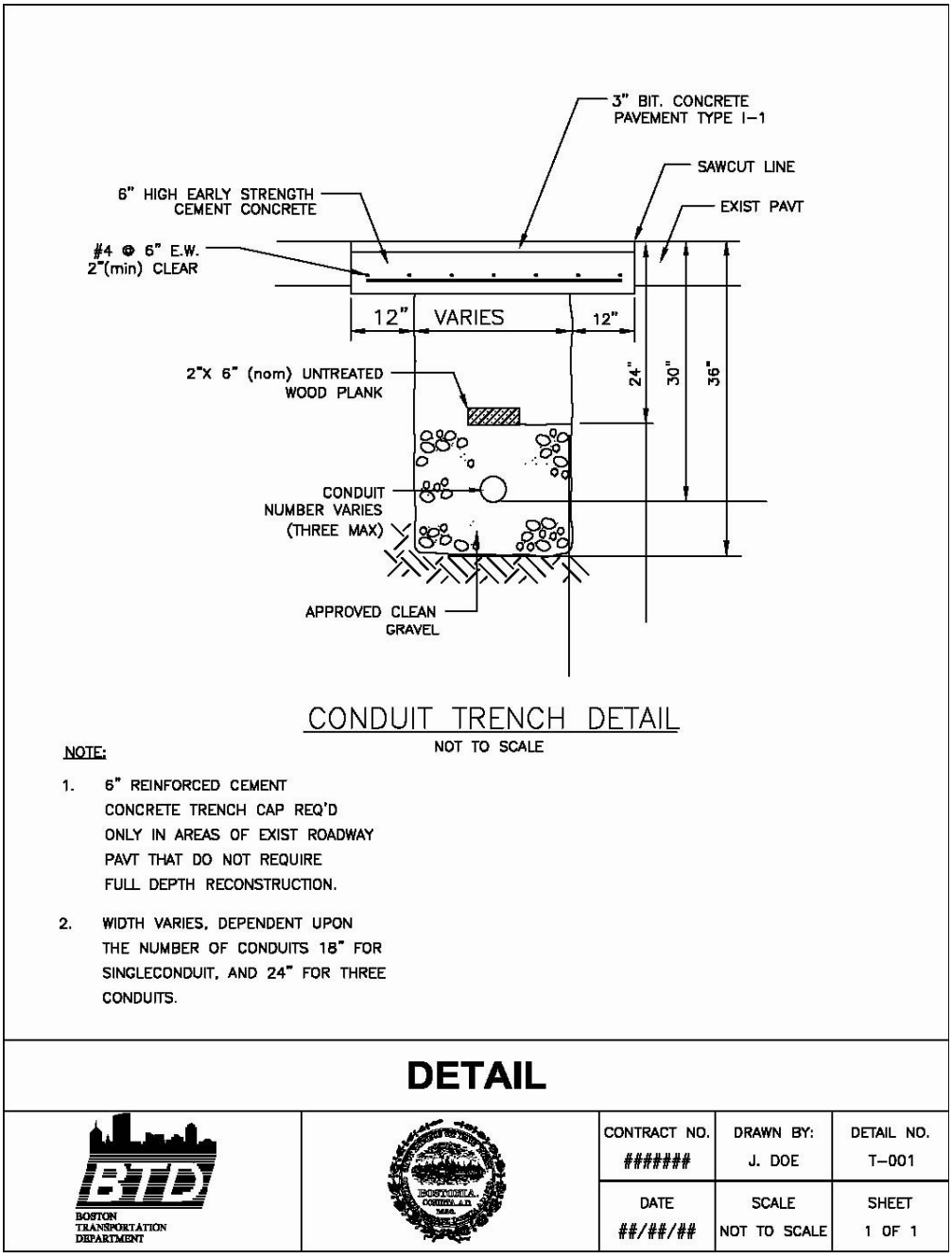
Figure 14. Pavement Marking and Signage Plan



BTD Standard Details

Standard detail sheets (placed on one of the BTD detail sheets) are used to show various standard details of items or equipment used by BTD. The BTD standard detail template shall be used for all details that may be folded into project specifications. In a majority of cases, these drawings are not to scale. All objects can be placed in paper space (see **Figure 15).**

Figure 15. BTD Standard Detail Sheet


3" BIT. CONCRETE PAVEMENT TYPE I-1
SAWCUT LINE
EXIST PAVT
6" HIGH EARLY STRENGTH CEMENT CONCRETE
#4 @ 6" E.W. 2"(min) CLEAR
12"
VARIES
12"
24"
30"
36"
2"X 6" (nom) UNTREATED WOOD PLANK
CONDUIT NUMBER VARIES (THREE MAX)
APPROVED CLEAN GRAVEL
CONDUIT TRENCH DETAIL
NOT TO SCALE
NOTE:
1. 6" REINFORCED CEMENT CONCRETE TRENCH CAP REQ'D ONLY IN AREAS OF EXIST ROADWAY PAVT THAT DO NOT REQUIRE FULL DEPTH RECONSTRUCTION.
2. WIDTH VARIES, DEPENDENT UPON THE NUMBER OF CONDUITS 18" FOR SINGLECONDUIT, AND 24" FOR THREE CONDUITS.
DETAIL
BTD
BOSTON TRANSPORTATION DEPARTMENT
CONTRACT NO. ######
DRAWN BY: J. DOE
DETAIL NO. T-001
DATE ##/##/##
SCALE NOT TO SCALE
SHEET 1 OF 1

Chapter Five

Drawing and Design Files

This chapter describes filing and naming conventions to be used. This standard procedure, if followed, will allow for a predictable way of saving or recalling files. Variations from this will cause confusion and may lead to lost files. All users must follow this convention.

Drawing File and Subdirectory Structure

BTD cutsheets and xrefs shall be kept in the same folder. This makes it easier to couple sets of drawings as they progress from draft to final submission. Keeping all files in a single folder also eases the delivery of drawings and their xrefs via e-mail or on compact disk (CD).

The most current designs on a project should be kept in a folder named CURRENT. As a project progresses, copies of previous designs shall be archived. These shall then be made "read only" and the folder name changed from CURRENT to the year and month they were submitted (#### XXX). Because the drawings are kept in one folder and the xref paths are not saved, AutoCAD automatically loads the correct dwg files when a cutsheet is opened.

Drawing File Naming Conventions

Identifying the contents of a given sheet based on its filename can be difficult. This is especially the case on larger projects.

Design Files

Design file names should include the intersection number, street names at the corner, and the date the drawing was approved. Below is a sample design filename.

INT567_PARKMAN_ADAMS_2009/09/23.dwg

Cutsheet Files

To make the cutsheet plan identification easier, the following standardized prefixes should be used:

G-###	Title/Index Sheet, General Notes and Legend Sheet
TMP-###	Traffic Management Plans
SP-###	Traffic Signal Plans
SS-###	Traffic Signal Schedules
PM-###	Pavement Marking and Signage Plans
DET-###	BTD Standard Details

Chapter Six

Drawing Setup and Structure

Use of Model Space and Paper Space

BTD CAD standards make use of ***model space*** and ***paper space.*** Here's a list of items that can be found in each mode.

Model Space

The model space mode includes:

- xref'd surveys,
- base mapping,
- traffic management equipment,
- traffic signal equipment,
- construction equipment, and
- pavement markings.

To aid in the creation of a city-wide CAD network of files, all data placed in model space should be placed according to the NAD83 datum, Massachusetts State Plan Mainline Zone coordinate system. A point of reference for such placement is the Boston Water and Sewer Commission City of Boston Basemap.

Paper Space

The paper space mode includes:

- general notes and legends,
- dimensions,
- leader lines and notes, and
- sign symbols.

Plan Sheet and Drawing Border Size

Information on drawings shall be arranged for easy and clear interpretation. Drawings shall be complete as to details, dimensions, and sizes. Completed drawings shall be suitable for obtaining clear and legible full-scale and reduced copies. Every effort should be made to ensure conformance to these standards:

- Drawing scale shall be 1" = 20'-0" to clearly show the degree of detail desired and provide space for text. When large sections of an area need to be shown, a scale of 1" = 40'-0" shall be used.
- Anticipation of space requirements, including the use of additional drawings when needed, shall provide room for all drawing components and future revisions without overcrowding.
- A layout **must be created** for each and every cutsheet or submitted drawing. It doesn't matter if the drawing is in model space or paper space.
- The standard BTD sheet size is 34" x 22". A half-size sheet can be sent directly to the a 17" x 11" printer by selecting the second border from the outside and scaling the drawing down 1:2.
- No other sizes shall be used without approval of the project manager. Use of one standard size for all drawings simplifies handling for reproduction, distribution, and filing purposes. A template file for BTD's 34" x 24" border can be found at *\:**\btd-34x22.dwt. (AutoCAD directions: Start a new drawing from the pull-down menu; File; New; then select the appropriate BTD template).

- BTD uses a "Real World Coordinate" format to construct drawings. All borders shall be placed in paper space regardless of the presence of a viewport.

Drawing Scales

The standard scale for all drawings shall be 1:20 for full-size drawings. In situations where greater areas need to be shown, a scale of 1:40 is permissible. Other scales can only be used with BTD's expressed consent.

The scale of the drawing shall not be included in the title information; instead, an engineering scale bar shall be placed on every drawing that has been created to a scale.

BTD detail sheets are not required to be at scale.

Xrefs

Xrefs shall be used whenever a part of a basemap or other information is going to be used in more than one drawing. In this way, any changes are automatically updated in all of the associated drawings.

For small projects where only one or two sheets are needed, it's acceptable to place all components of the drawing in a single drawing (making use of the model space and layout tabs).

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Chapter Seven

Drafting Procedures

Order of Plan Sheets

Sheets shall be placed in order as follows:

Traffic Signal Sheet Sets:

- Title sheet
- General notes and legend
- Existing conditions
- Existing signal schedule
- Proposed conditions
- Proposed signal schedule

Traffic Pavement and Signing Sheet Sets:

- Title sheet
- General notes and legend
- Existing conditions
- Proposed conditions
- Sign summary sheet

Construction Management Plan Sets:

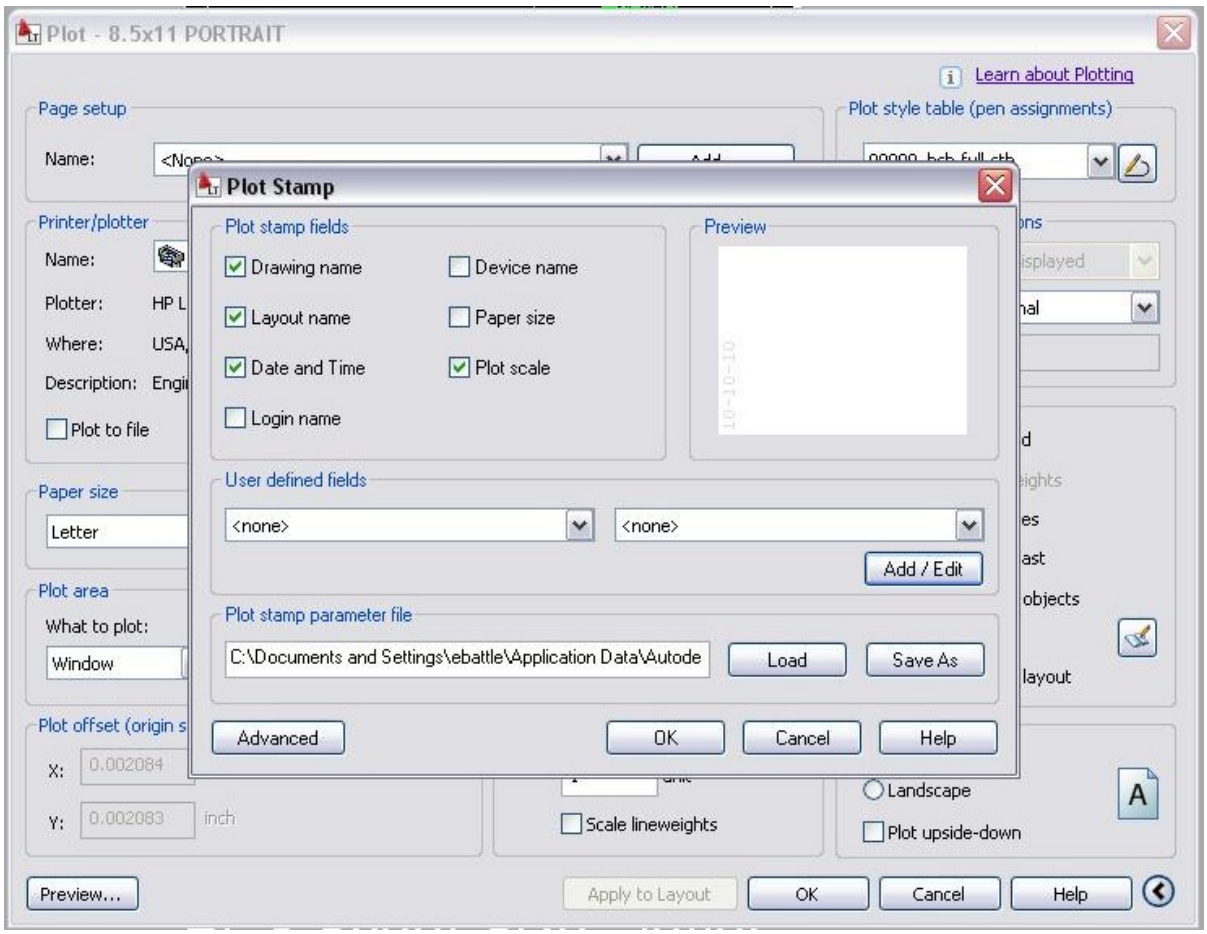
- Title sheet
- General notes and legend
- Existing conditions
- Construction phases
- Final conditions
- Sign summary sheet

Plot Stamp

To ease data recovery, each hard copy of a drawing created by or submitted to BTD shall include a plot stamp aligned vertically along the bottom left hand side of the sheet.

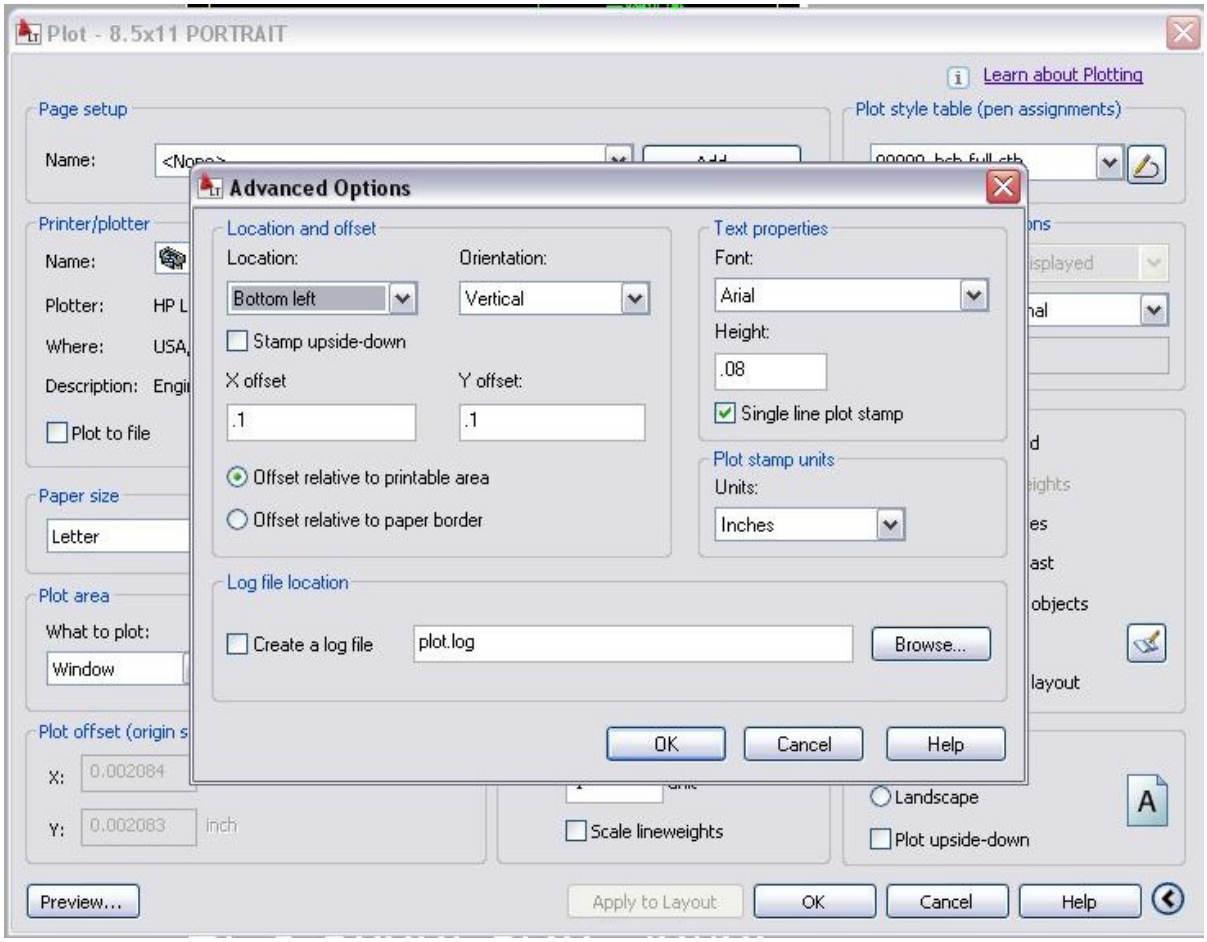
Turn Create Plot Stamping on by checking the box next to Plot Stamp in the plot dialogue box. Selecting the Plot Stamp Settings button brings up the dialogue box shown below. Please be sure to show, at a minimum, the drawing name, layout name, date and time, and plot scale as shown in **Figure 16.**

Figure 16. Plot Stamp



The orientation, size and text font can be adjusted as shown in **Figure 17.**

Figure 17. Plot Stamp Advanced Options



Drafting Details, North Arrow, Scale Bars, and Legends

Each traffic management plan, traffic signal plan, and pavement marking plan shall contain a north arrow and a scale bar. The north arrow shall be placed in the upper left corner of the sheet. The scale bar shall be placed on the lower right hand side of the sheet.

If a general notes and legend plan is not included, a legend shall be placed on each sheet. Signal faces shall be included on both traffic signal plans and the traffic signal schedule.

Notes

General notes for each drawing set shall be included on the general notes and legend sheet. Notes specific to an individual sheet may be included on those individual sheets.

All notes shall be placed on the appropriate layer and be the appropriate text style.

Chapter Eight

Layers, Colors, and Pen Weights

Layer Naming Conventions

AutoCAD uses color to control pen and line widths at plot time. The generic layering scheme shall be used on BTD drawings. Line conventions and linetypes describe the size, construction, and applications of the various lines used in the creation of engineering drawings. For creating solid lines, the linetype pattern is referred to as CONTINUOUS. When broken linetypes are created in AutoCAD, the dash and gap lengths may vary in size, depending on line length. All linetypes and conventions are shown in **Appendix A.**

Generic Layering Scheme

The generic layering scheme is as follows:

BTD-ATURN-XXX	All AutoTURN moves. XXX = vehicle used and direction.
BTD-BARRIER	All proposed barrier equipment (drums, jersey/tapered barrier, and VMS).
BTD-BARRIER-X	All existing barrier equipment (drums, jersey/tapered barriers, and VMS).
BTD-CONDUIT	All signal conduit, proposed and existing (line type HIDDEN2).
BTD-CONDUIT-REMOVED	All existing signal conduit (linetype HIDDEN2).
BTD-CONDUIT-X	All existing signal conduit (linetype HIDDEN2).
BTD-CROSSWALK	All proposed crosswalk markings.
BTD-CROSSWALK-X	All existing crosswalk markings.
BTD-CURB	All proposed edge of road and curb details.
BTD-CURB-X	All existing edge of road and curb details, including handicapped ramps.
BTD-DIMS	All dimensions in a drawing file.
BTD-HATCH	All hatch files.
BTD-MATCHLINE	Any matchline in a drawing including text (line type PHANTOM).
BTD-PAVEMARK	All proposed lane markings.
BTD-PAVEMARK-DYCL	All proposed double yellow center lines.
BTD-PAVEMARK-LEGENDS	All proposed pavement symbol markings (ONLY, turn arrows, etc.).
BTD-PAVEMARK-X	All existing pavement markings (stop lines, turn arrows, etc.).
BTD-PEDRAMP	Proposed wheelchair ramps.
BTD-SIGN	All proposed sign posts (does not include callouts).
BTD-SIGN-X	All existing sign posts (does not include callouts).
BTD-SIGNAL	All proposed signal equipment (posts, heads, etc.).
BTD-SIGNAL-LOOP	All proposed signal loop equipment.
BTD-SIGNAL-LOOP-X	All existing signal loop equipment.
BTD-SIGNAL-REMOVED	All existing signal equipment (posts, loops, heads, etc.).
BTD-SIGNAL-X	All existing signal equipment (posts, loops, heads, etc.).
BTD-STRUCTURE	All non-traffic-related objects included by BTD.
BTD-TBLOCK	All title block text, scales, and border.
BTD-TEXT	All text in a drawing file, including leader lines and attached text.
BTD-TEXT-X	All text in a drawing file, including leaders that represent existing conditions.
BTD-VPORT	Any viewports used in a file.
BTD-WORKZONE	Hatching indicating where work will be done in a phase.
BTD-WORKZONE-X	Hatching indicating where work has been done in a phase.
BTD-XREF	All attached external references and raster images.

This layering scheme is available when a BTD drawing file template is used to start a new drawing. Refer to **Appendix A** for more information on AutoCAD colors and pens.

Colors and Pen Weights

AutoCAD controls line weights by assigning pen widths to AutoCAD. Line widths vary as follows:

AutoCAD Color Number	AutoCAD Screen Color	AutoCAD Plot Color	Line Width
1	red	black	0.017
2	yellow	black	0.013
3	green	black	0.017
4	cyan	black	0.017
5	blue	black	0.021
6	magenta	black	0.026
7	white	black	0.021
8	gray	Black (40% screen)	0.017
96	hunter green	black (7)	0.007

The colors listed above are used in the majority of BTD drawings. Line type widths represent a full-size drawing. Though this chart illustrates text settings, the same settings also apply to graphic entities. Color controls line widths at plot time, not the layer on which the entity(ies) is/are placed or drawn.

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Chapter Nine

Annotation

This section covers text requirements except for title blocks. Requirements are for full-size BTD drawings, unless otherwise specified.

Text Styles

In most cases, text shall be placed in paper space on the layer BTD-TEXT or BTD-TEXT-X. All text should be placed so that it can be read from the bottom or right-hand side of the sheet. Standard text size for notes and dimensions shall be .115" (style R115). Text shall not be smaller than .080" (style R080). Street names shall be about .165" (style R165) high. Text size of an existing style should not be changed; rather, a new style should be created using the existing one as a template.

All text shown in sign summary or signal schedules shall be center-justified, single-line text (DTEXT). All other notes (general notes, major items descriptions) shall be left-justified, multi-line text (MTEXT).

Notes shall be separated by a space the same height as the text. The number used and the note shall be separated by one tabbed space.

Horizontal Text Spacing

BTD spacing between words is one space, or one click of the space bar on the keyboard. The horizontal width factor should always be set to 1.0. This setting must not be changed to fit text into cramped spaces on drawings; e.g., fitting text into a title block. The following standards should also be kept:

- Between words and sentences: one space.

- When creating notes, the note number and the first line of the note should be separated by one tabbed space.
- Between whole numbers and fractions in mixed numbers: one space; e.g., 3 ½" or 6 ¾".

Vertical Text Spacing

Each note in a list of notes shall be numbered, with all decimal points after numbers aligned vertically. The text in all notes shall be left-justified, with one tabbed space between the decimal point after the note number and the first letter of the note.

Leader Lines

A leader line shall be a single, straight, inclined line, except for a .125" to .25" short portion (tail) extending horizontally to the top line of the note. When practical, the angle between the leader and the termination point shall be at least 30 degrees and preferably between 45 and 70 degrees. When pointing to dimensions or bubbles, the arrow should be eliminated.

Practices to Avoid

The following practices should be avoided:

- Crossing leader lines.
- Longer than necessary leaders; i.e., select orientation and location to minimize the length of leaders.
- Bends in leaders, except for the tail.

Match Lines

Match lines are used for reference purposes when an image is to be continued on the same or another drawing without omitting a portion of the view. Match lines are normally labeled FOR CONTINUATION SEE (BELOW, ABOVE, or DRAWING XXX). "BELOW" and "ABOVE" are used when image continuations are shown on the same sheet.

Dimensioning

Dimensioning is a method used to define the geometric characteristics of a layout by use of extension lines, dimension lines, and units of measure. The settings in this chapter are preset when a drawing is started using the BTD standard template. Dimensioning is one area of AutoCAD where the Help button is useful, so check there if you have questions that aren't answered in this section.

Dimension Style Manager

The dimension style manager controls the appearance of the dimensions created in a drawing (see **Figure 18).** From this dialogue box, the user can select a new dimension style ("dimstyle"), create a new one from an existing style, modify a style, override the current style temporarily, or compare two styles. The greatest confusion tends to occur when users try to modify an existing style.

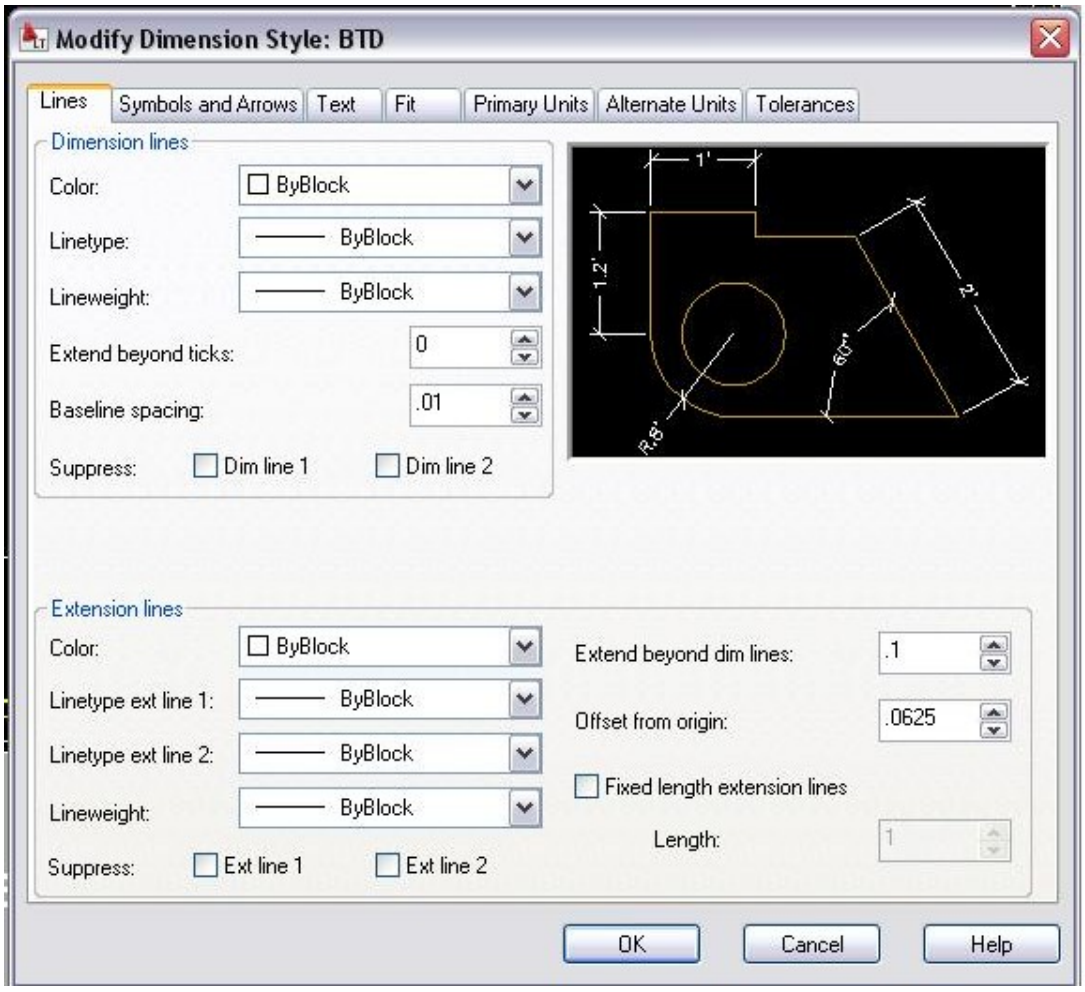
Figure 18. Dimension Style Screen

IMPORTANT: If an existing style is modified and saved as the same style name, the changes made will affect any existing dimension with that dimstyle.

Modify Existing Style—Lines and Arrows

The Modify Dimension Style dialogue box is organized into seven tabs, two of which do not apply to the traffic engineering industry (see **Figure 19).** The first, lines, is broken down into two sub-categories. Dimension lines are the lines on which the dimension text sits. The most important variable in this category is "baseline spacing." This variable controls how much space is needed around the dimension text. The smaller the number, the more text can fit between the extension lines without being forced out.

Figure 19. Modify Dimension Style Screen



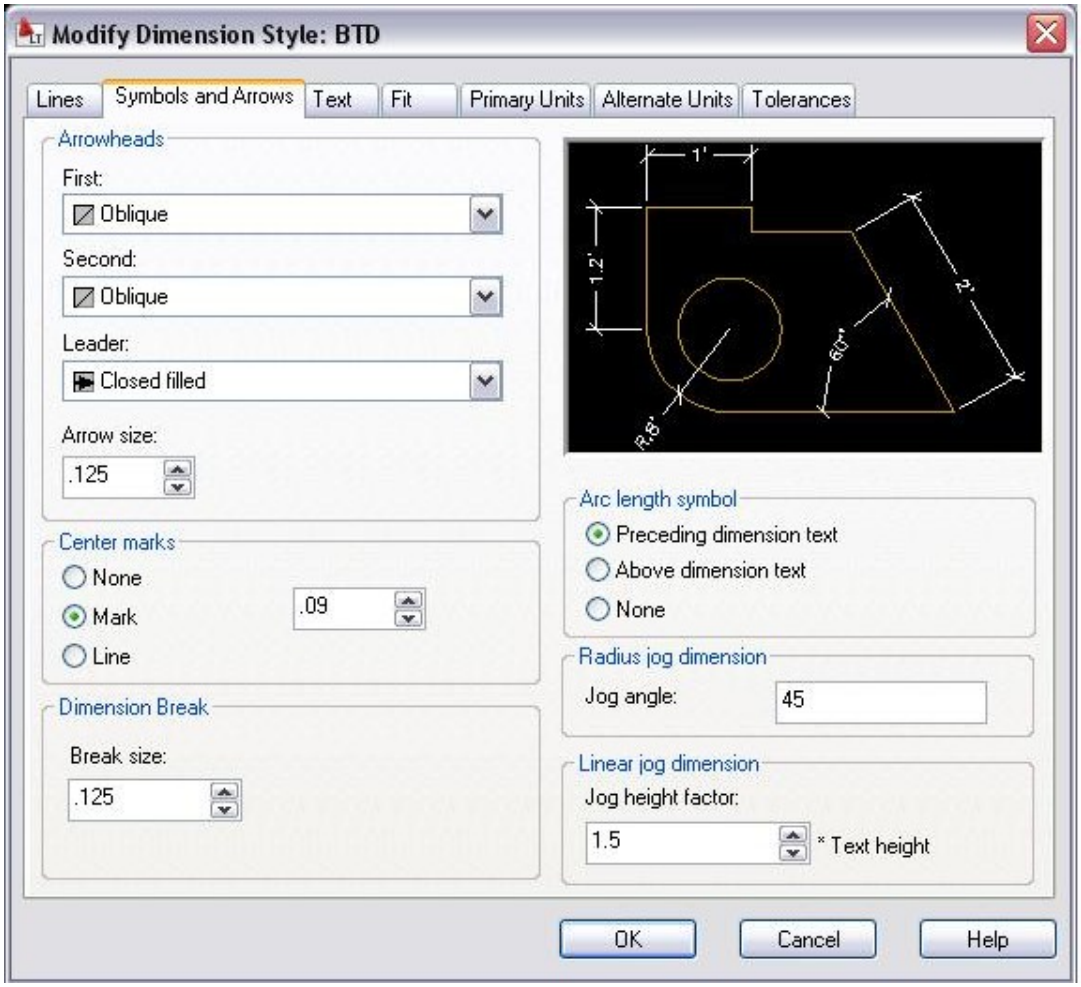
The second category, extension lines, concerns the lines that are perpendicular to or radiate out from the object being measured. In this category, you can suppress

either extension line. The distance an extension line goes beyond the dimension line or how far away from the object the line starts can also be set.

Symbols and Arrows

The next tab, Symbols and Arrows, controls the type and size of arrowheads and the tick marks that mark the center of a circle (see **Figure 20).** There are several types of arrowheads. The BTD standard oblique style makes the dimensioning of lanes both easier and neater.

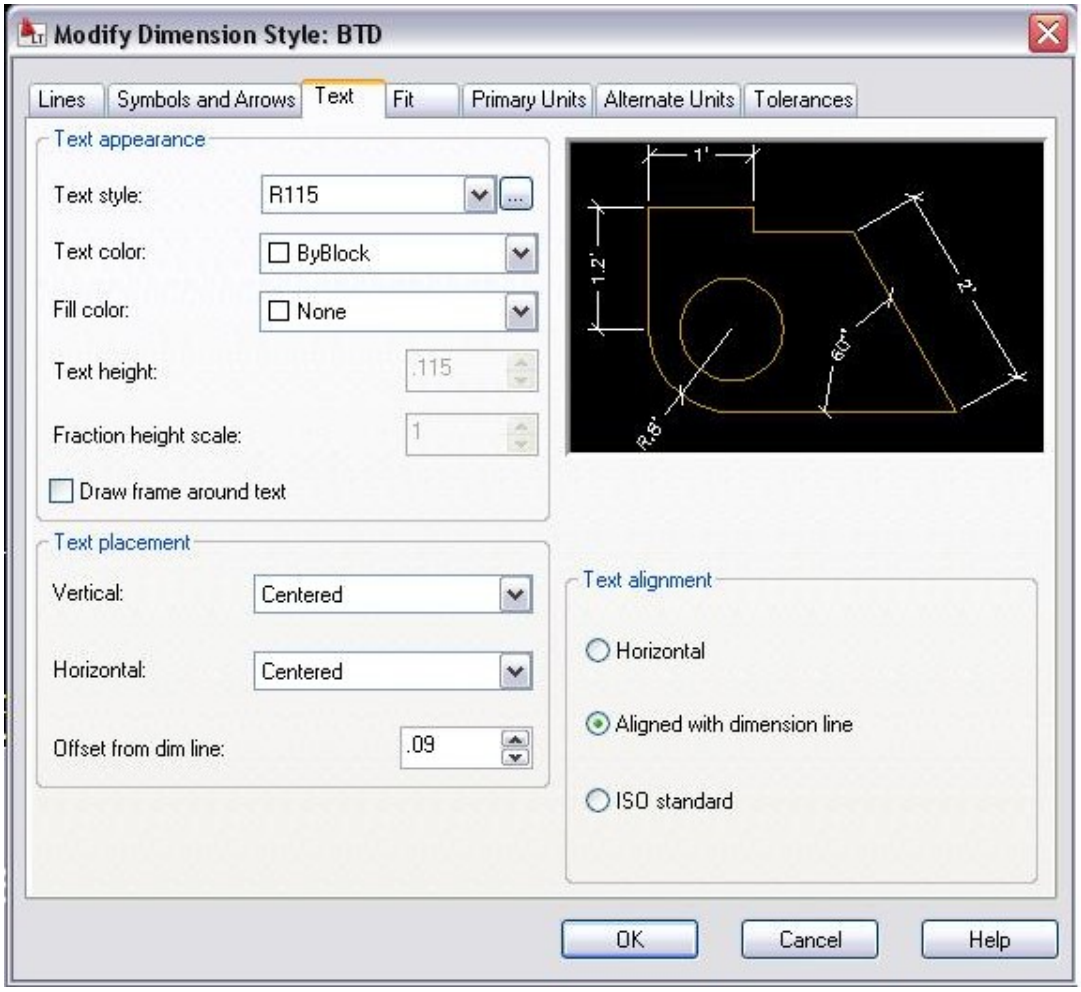
Figure 20. Symbols and Arrows Screen



Modify Existing Style—Text

With the Text tab, the text style and height can be changed (see **Figure 21).** BTD uses the same dimension style in its dimension and general notes: R115.

Figure 21. Text Style Screen



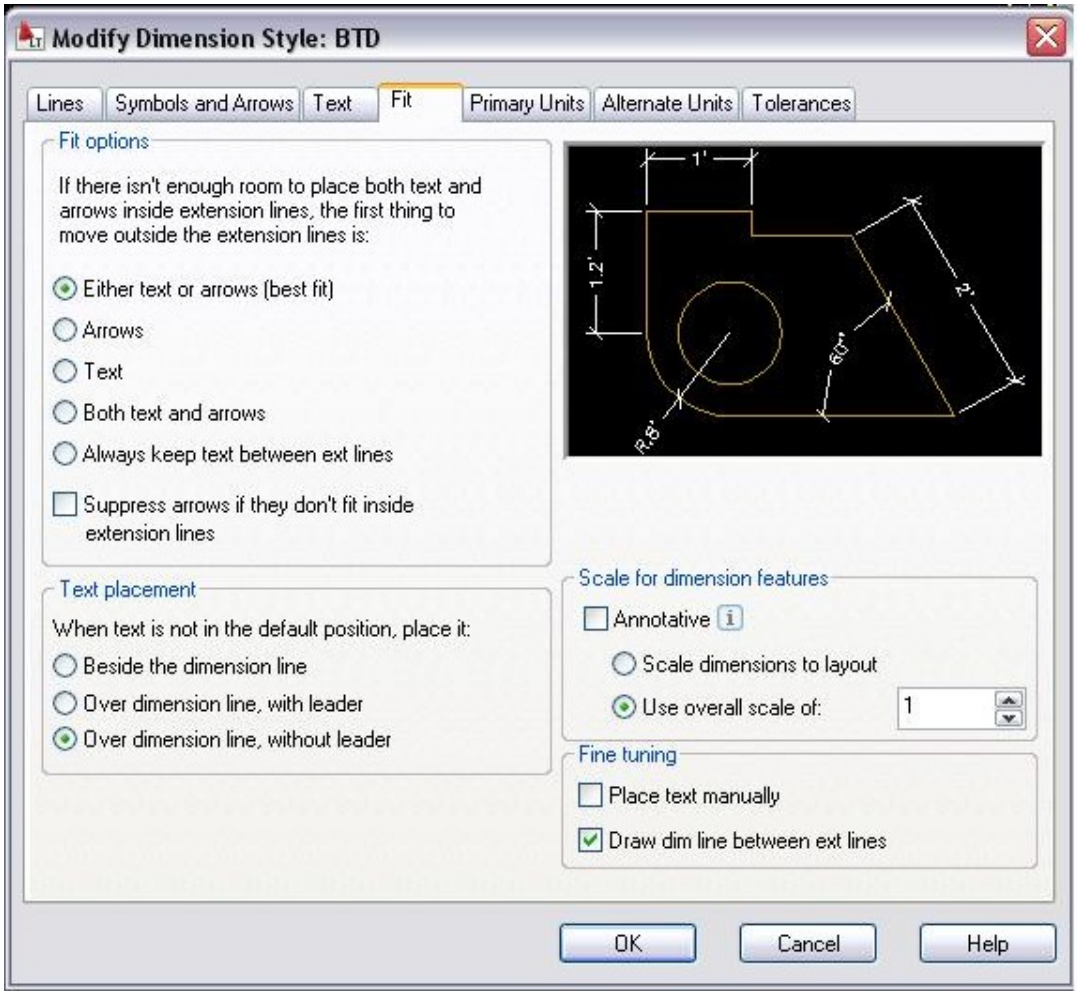
Occasionally, a box must be placed around leader line or dimension text. Instead of manually drawing a box around text, click in the "Draw frame around text" box to automatically draw the box. As an added benefit, the text box and justification are the same every time.

Under normal drafting situations, the last two sections, text placement and text alignment, shouldn't be changed from the settings shown here in the dialogue box. When changes to any settings are necessary, the preview box is extremely helpful.

Modify Existing Style—Fit

The Fit tab controls the placement of text and arrowheads (see **Figure 22).** Generally, these settings are fine as is. Occasionally, dimensions may need to be placed in model space.

Figure 22. Fit Screen



If this is the case, many of the settings in the standard BTD dimstyle must be modified to reflect the increased size of its entities.

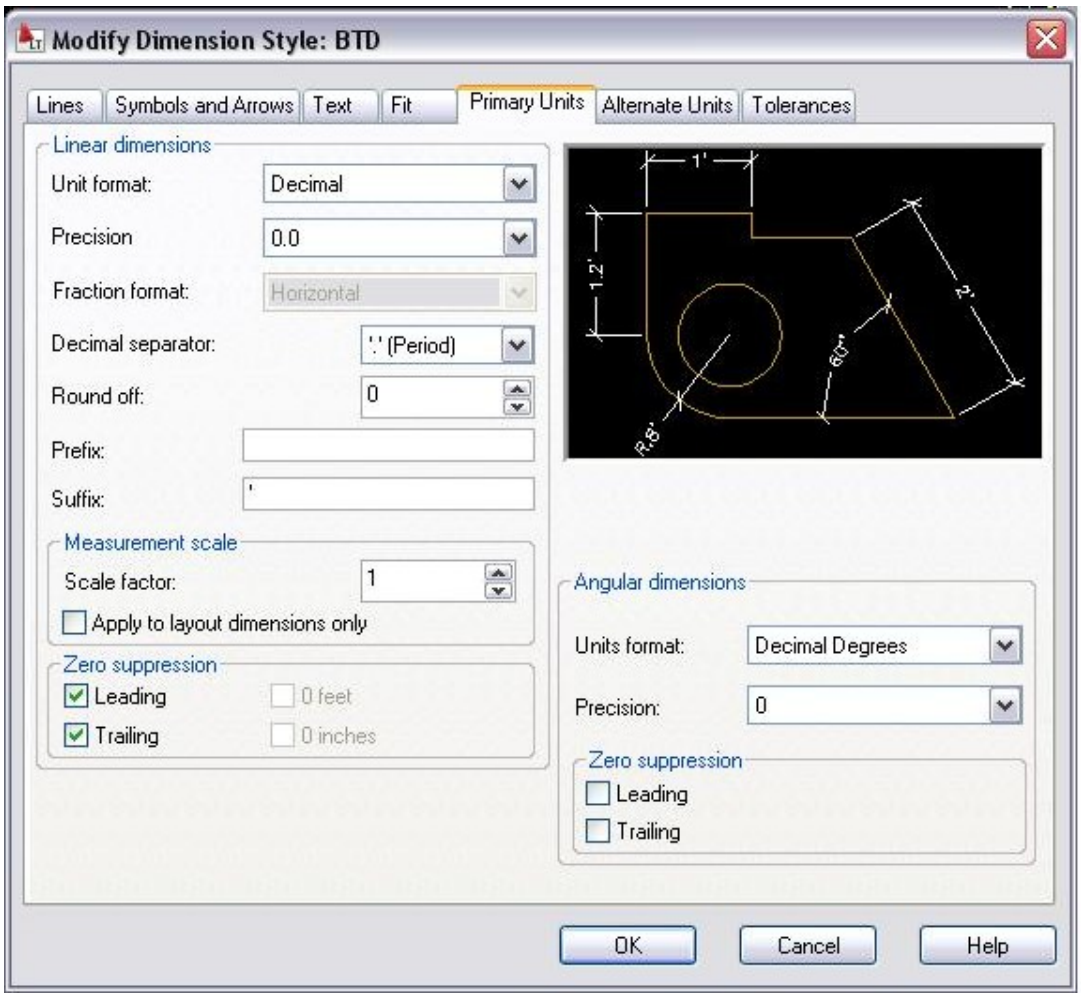
The Scale for Dimension Features variable eliminates the need to go through each tab and make adjustments. By entering a scale at which the roll plan will be plotted, every feature (arrowhead size, offsets, etc.) is updated.

Leaving the "Place text manually when dimensioning" box unchecked places dimension text in the center of the dimension line. After the dimension has been placed, text can be moved by selecting the dimension and using the grip located on the text.

Modify Existing Style—Primary Units

The Primary Units tab is straightforward and easy to understand (see **Figure 23).** In the first section, Linear Dimensions, you can set unit formats, dimension precision (usually 0 or 0.0), and any prefixes or suffixes you want automatically placed in your dimension (such as ' or M).

Figure 23. Primary Units Screen



The Measurement Scale variable is extremely helpful. When you input the viewport scale dimension, text automatically shows the correct dimension; for instance, on a 20-scale drawing a line that is 20 feet long in model space will be shown as an inch long in the layout, unless this scale variable is change to 20.

The rest of this tab typically remains untouched. Typically, there's no need to change the way angular dimensions are shown or whether or not zeros are shown on whole numbers or decimals.

Modify Existing Style—Altering Units and Tolerances

The Altering Units and Tolerances tabs are generally used in mechanical engineering and hardly ever used at BTD.

Placement of Dimensions

Strict rules govern the placement of dimensions. Situations vary, but everyone should adhere to these standards.

As with most items placed on a layout, dimensions shall be placed in a neat, organized manner. This includes avoiding placement in streets or on top of curbs or buildings that aren't screened.

Dimensions, like text, shall be placed in such a way that they can be read from the bottom of the sheet, left to right, or from the right-hand side of the sheet, bottom to top. Occasionally, AutoCAD places the text at the wrong angle by default. This is easy to fix by going to the Dimension pull-down menu and selecting Align Text>Angle. Generally, the text just needs to be rotated 90 degrees.

Finally, dimensions should NEVER cross. This includes dimension, extension, and leader lines.

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Appendix A

Line Types and Conventions

LAYER	DESCRIPTION	COLOR
BTD–ATURN–XXX	ALL AUTOTURN MOVES. xxx=VEHICLE USED AND DIRECTION	7
BTD–BARRIER	ALL PROPOSED BARRIER EQUIPMENT (DRUMS, JERSEY AND TAPERED BARRIER, VMS)	3
BTD–BARRIER–X	ALL EXISTING BARRIER EQUIPMENT (DRUMS, JERSEY AND TAPERED BARRIER, VMS)	8
BTD–CONDUIT	ALL PROPOSED SIGNAL CONDUIT (LINETYPE HIDDEN2)	2
BTD–CONDUIT–X	ALL EXISTING SIGNAL CONDUIT (LINETYPE HIDDEN2)	2
BTD–CONDUIT–REMOVED	ALL EXISTING SIGNAL CONDUIT TO BE REMOVED (LINETYPE HIDDEN2)	8
BTD–CROSSWALK	ALL PROPOSED CROSSWALK MARKINGS	2
BTD–CROSSWALK–X	ALL EXISTING CROSSWALK MARKINGS	8
BTD–CURB:	ALL PROPOSED EDGE OF ROAD AND CURB DETAILS	1
BTD–CURB–X	ALL EXISTING EDGE OF ROAD AND CURB DETAILS INCLUDING HANDICAPPED RAMPS	8
BTD–DIMS	ALL DIMENSIONS IN A DRAWING FILE	3
BTD–HATCH	ALL HATCH OBJECTS	8
BTD–LAYOUT	ALL LAYOUT LINES (LAYER DOES NOT PRINT)	1
BTD–MATCHLN	ANY MATCHLINE IN A DRAWING INCLUDING TEXT (LINETYPE PHANTOM)	6
BTD–PAVEMARK	ALL PROPOSED LANE MARKINGS	2
BTD–PAVEMARK–DYCL	ALL PROPOSED DOUBLE YELLOW CENTER LINES	11
BTD–PAVEMARK–LEGENDS	ALL PROPOSED PAVEMENT SYMBOL MARKINGS (ONLY, TURN ARROWS, ETC.)	2
BTD–PEDRAMP	PROPOSED WHEELCHAIR RAMPS	2
BTD–PAVEMARK–X	ALL EXISTING PAVEMENT MARKINGS (STOP LINES, TURN ARROWS, ETC.)	8
BTD–SIGN	ALL PROPOSED SIGN POSTS (DOES NOT INCLUDE CALLOUTS)	5
BTD–SIGN–X	ALL EXISTING SIGN POSTS (DOES NOT INCLUDE CALLOUTS)	8
BTD–SIGNAL	ALL PROPOSED SIGNAL EQUIPMENT (POSTS, HEADS, ETC.)	2
BTD–SIGNAL–LOOP	ALL PROPOSED SIGNAL LOOP EQUIPMENT	2
BTD–SIGNAL–LOOP–X	ALL EXISTING SIGNAL LOOP EQUIPMENT	8
BTD–SIGNAL–X	ALL EXISTING SIGNAL EQUIPMENT (POSTS, LOOPS, HEADS, ETC.)	2
BTD–SIGNAL–REMOVED	ALL SIGNAL EQUIPMENT TO BE REMOVED (POSTS, LOOPS, HEADS, ETC.)	8
BTD–STRUCTURE	ALL NON–TRAFFIC–RELATED OBJECTS	5
BTD–TBLOCK	ALL TITLE BLOCK TEXT, SCALES, AND BORDERS	2
BTD–TEXT	ALL TEXT IN A DRAWING FILE, INCLUDING LEADER LINES AND ATTACHED TEXT	3
BTD–TEXT–X	ALL TEXT IN A DRAWING FILE, INCLUDING LEADERS THAT REPRESENT EXISTING CONDITIONS	8
BTD–VPORT	ALL VIEWPORTS USED IN A FILE	7
BTD–XREF	ALL ATTACHED EXTERNAL REFERENCES AND RASTER IMAGES	7

COMMON LINETYPES

LINETYPE	SAMPLES	USE
CONTINUOUS		BASIC ACAD LINETYPE
PHANTOM		MATCH LINES
HIDDEN2		PROPOSED CONDUIT PATHS
HIDDEN2		EXISTING CONDUIT PATHS
HIDDEN2		CONDUIT PATHS TO BE REMOVED
BWLL–BTD		BROKEN WHITE LANE LINE 10' LINE 20' SPACE
DWLL		DOTTED WHITE LANE LINE 2' LINE 4' SPACE
DASHED		BASELINE

PICK THIS BORDER WHEN PRINTING 17x11 HALF SCALES

BTD TEXT STYLES

STYLE	SAMPLES	HEIGHT	COLOR
R080	ABCDE–12345	0.080	3
R100	ABCDE–12345	0.100	3
R115	ABCDE–12345	0.115	3
R130	ABCDE–12345	0.130	3
R165	ABCDE–12345	0.165	6
R240	ABCDE–12345	0.240	6

* ALL TEXT STYLES USE ROMANS.SHX FONT
* ALL WIDTH FACTORS = 1.0

STANDARD COLOR TABLE FILE (BTD–FULL.PCP)

COLOR	PEN NO.	SCREEN	SAMPLES	WIDTH
1	7 (BLACK)	100		0.017
2	7 (BLACK)	100		0.013
3	7 (BLACK)	100		0.017
4	7 (BLACK)	100		0.017
5	7 (BLACK)	100		0.021
6	7 (BLACK)	100		0.026
7	7 (BLACK)	100		0.021
8	7 (BLACK)	40		0.017
96	7 (BLACK)	100		0.007

0 10 20 40 80 FEET

ENGINEERING SCALE

SUBMISSION LEVEL

BTD
BOSTON TRANSPORTATION DEPARTMENT

DESIGNED BY JOHN DOE
DRAWN BY JOHN DOE
CHECKED BY JOHN DOE
APPROVED BY JOHN DOE

CITY OF BOSTON TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION
TRAFFIC SIGNAL IMPROVEMENTS

LAYER AND LINETYPE CONVENTIONS

DORCHESTER
INTERSECTION NUMBER 0001

AREA: –
DISTRICT: #

DATE:
DRAWING NO. XX–###
SHEET # OF #

DIRECTOR OF ENGINEERING

DRAWING PREPARED BY BOSTON TRANSPORTATION DEPARTMENT

Appendix B

Traffic Equipment Blocks

PROPOSED TRAFFIC EQUIPMENT BLOCKS

- SIGN POST
- VARIABLE MESSAGE SIGN
- ARROW BOARD
- SINGLE HEAD METER
- DOUBLE HEAD METER
- MULTI–SPACE METER
- VEHICLE
- POLICE CAR
- HANDICAP RAMP
- FIRE HYDRANT
- LIGHT POST
- BICYCLE RACK
- DRUM
- DRUM WITH FLASHING LIGHT
- TAPERED JERSEY BARRIER
- TYPE III BARRICADE
- ATTENUATOR
- IMPACT DRUMS
- TRAFFIC CONE
- 20' CONSTRUCTION GATE
- 30' CONSTRUCTION GATE
- 40' CONSTRUCTION GATE

EXISTING TRAFFIC EQUIPMENT BLOCKS

- SIGN POST
- VARIABLE MESSAGE SIGN
- ARROW BOARD
- SINGLE HEAD METER
- DOUBLE HEAD METER
- MULTI–SPACE METER
- VEHICLE
- POLICE CAR
- HANDICAP RAMP
- FIRE HYDRANT
- LIGHT POST
- BICYCLE RACK
- DRUM
- DRUM WITH FLASHING LIGHT
- TAPERED JERSEY BARRIER
- TYPE III BARRICADE
- ATTENUATOR
- IMPACT DRUMS
- TRAFFIC CONE
- 20' CONSTRUCTION GATE
- 30' CONSTRUCTION GATE
- 40' CONSTRUCTION GATE

PAVEMENT MARKING BLOCKS

- THRU ARROW+ONLY PAVEMENT MARKING
- RIGHT ARROW+ONLY PAVEMENT MARKING
- LEFT ARROW+ONLY PAVEMENT MARKING
- THRU/RIGHT ARROW+ONLY PAVEMENT MARKING
- THRU/LEFT ARROW+ONLY PAVEMENT MARKING
- THRU ARROW PAVEMENT MARKING
- RIGHT ARROW PAVEMENT MARKING
- LEFT ARROW PAVEMENT MARKING
- THRU/RIGHT ARROW PAVEMENT MARKING
- THRU/LEFT ARROW PAVEMENT MARKING
- ONLY PAVEMENT MARKING
- STOP PAVEMENT MARKING
- CARPOOL PAVEMENT MARKING
- HANDICAP PARKING PAVEMENT MARKING
- SHARROW
- BIKE LANE MARKER

EXISTING PAVEMENT MARKING BLOCKS

- THRU ARROW PAVEMENT MARKING
- RIGHT ARROW PAVEMENT MARKING
- LEFT ARROW PAVEMENT MARKING
- THRU/RIGHT ARROW PAVEMENT MARKING
- THRU/LEFT ARROW PAVEMENT MARKING
- ONLY PAVEMENT MARKING
- STOP PAVEMENT MARKING
- CARPOOL PAVEMENT MARKING
- HANDICAP PARKING PAVEMENT MARKING
- SHARROW
- BIKE LANE MARKER

0 10 20 40 80 FEET

ENGINEERING SCALE

SUBMISSION LEVEL

BOSTON TRANSPORTATION DEPARTMENT

DESIGNED BY JOHN DOE
DRAWN BY JOHN DOE
CHECKED BY JOHN DOE
APPROVED BY JOHN DOE

CITY OF BOSTON TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION
TRAFFIC SIGNAL IMPROVEMENTS

TRAFFIC EQUIPMENT & PAVEMENT BLOCKS

DORCHESTER
INTERSECTION NUMBER 0001

AREA: –
DISTRICT: #
DATE:
DRAWING NO. XX–###
SHEET # OF #

DIRECTOR OF ENGINEERING

DRAWING PREPARED BY BOSTON TRANSPORTATION DEPARTMENT

Appendix C

Signal Equipment Blocks

SIGNAL DESIGN BLOCKS

PROPOSED EQUIPMENT
LAYER: BTD–SIGNAL

- PROPOSED SIGNAL POST
- PROPOSED SIGNAL HEAD
- PROPOSED PEDESTRIAN SIGNAL HEAD
- PROPOSED PEDESTRIAN PUSH BUTTON
- PROPOSED AUDIBLE PEDESTRIAN PUSH BUTTON
- PROPOSED BTD CAMERA
- PROPOSED OPTICOM DETECTOR
- PROPOSED OPTICOM LIGHT
- PROPOSED OPTICALLY PROGRAMMED SIGNAL HEAD
- PROPOSED NON–METALLIC HANDHOLE (12x24)
- PROPOSED LOOP HANDHOLE (12x24)
- PROPOSED BTD MANHOLE
- PROPOSED CONTROLLER CABINET
- PROPOSED MAST ARM (LENGTH VARIES)
- PROPOSED LOOP (5'xVARIES)
- PROPOSED VIDEO DETECTION CAMERA

SIGNAL DESIGN BLOCKS

EXISTING EQUIPMENT OR TO REMAIN
LAYER: BTD–SIGNAL–X

- EXISTING SIGNAL POST
- EXISTING SIGNAL HEAD
- EXISTING PEDESTRIAN SIGNAL HEAD
- EXISTING PEDESTRIAN PUSH BUTTON
- EXISTING AUDIBLE PEDESTRIAN PUSH BUTTON
- EXISTING BTD CAMERA
- EXISTING OPTICOM DETECTOR
- EXISTING OPTICOM LIGHT
- EXISTING OPTICALLY PROGRAMMED SIGNAL HEAD
- EXISTING NON–METALLIC HANDHOLE (12x24)
- EXISTING LOOP HANDHOLE (12x24)
- EXISTING BTD MANHOLE
- EXISTING CONTROLLER CABINET
- EXISTING MAST ARM (LENGTH VARIES)
- EXISTING LOOP (5'xVARIES)
- VIDEO DETECTION CAMERA

SIGNAL DESIGN BLOCKS

EQUIPMENT TO BE REMOVED
LAYER: BTD–SIGNAL–REMOVED

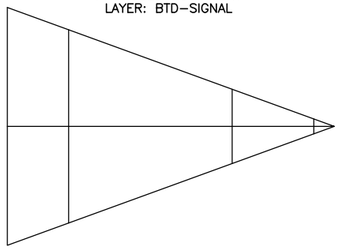
- SIGNAL POST TO BE REMOVED
- SIGNAL HEAD TO BE REMOVED
- PEDESTRIAN SIGNAL HEAD TO BE REMOVED
- PEDESTRIAN PUSH BUTTON TO BE REMOVED
- AUDIBLE PEDESTRIAN PUSH BUTTON TO BE REMOVED
- BTD CAMERA TO BE REMOVED
- OPTICOM DETECTOR TO BE REMOVED
- OPTICOM LIGHT TO BE REMOVED
- OPTICALLY PROGRAMMED SIGNAL HEAD TO BE REMOVED
- NON–METALLIC HANDHOLE TO BE REMOVED (12x24)
- LOOP HANDHOLE TO BE REMOVED (12x24)
- BTD MANHOLE TO BE REMOVED
- CONTROLLER CABINET TO BE REMOVED
- MAST ARM TO BE REMOVED (LENGTH VARIES)
- LOOP (5'xVARIES) TO BE REMOVED
- VIDEO DETECTION CAMERA TO BE REMOVED

CUTSHEET BLOCKS

- TRAFFIC FLOW ARROW
- TRAFFIC FLOW ARROW LEFT
- TRAFFIC FLOW ARROW RIGHT
- PEDESTRIAN FLOW ARROW
- (P) POLICE DETAIL SYMBOL
- (S) SIGNALIZED INTERSECTION SYMBOL

SIGNAL CONE OF VISION

PROPOSED EQUIPMENT
LAYER: BTD–SIGNAL



0 10 20 40 80 FEET

ENGINEERING SCALE

SUBMISSION LEVEL

BOSTON TRANSPORTATION DEPARTMENT

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CITY OF BOSTON TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION
TRAFFIC SIGNAL IMPROVEMENTS

SIGNAL EQUIPMENT & CUTSHEET BLOCKS

DORCHESTER
INTERSECTION NUMBER 0001

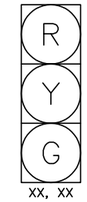
AREA: –
DISTRICT: #

DATE:
DRAWING NO. XX–###
SHEET # OF #

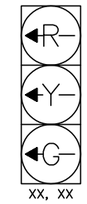
DIRECTOR OF ENGINEERING

DRAWING PREPARED BY BOSTON TRANSPORTATION DEPARTMENT

SIGNAL FACES



3 SECTION



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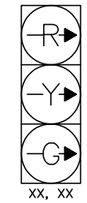

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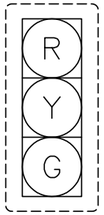
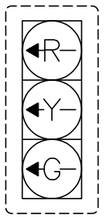
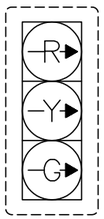


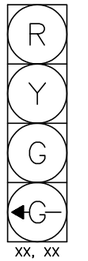
3 SECTION w/BACKPLATE



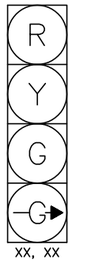
3 SECTION LEFT ARROW w/BACKPLATE



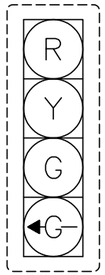
3 SECTION RIGHT ARROW w/BACKPLATE



4 SECTION LEFT ARROW



4 SECTION RIGHT ARROW



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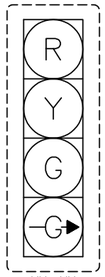
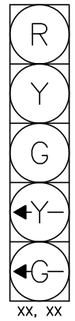


4 SECTION RIGHT ARROW w/BACKPLATE



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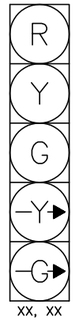

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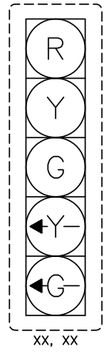

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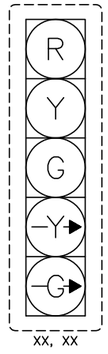
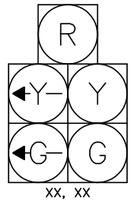
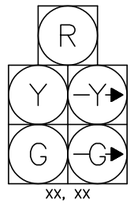




5 SECTION DOGHOUSE LEFT ARROW



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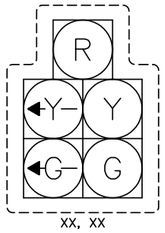

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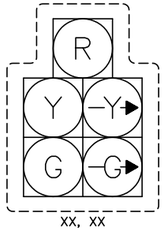


5 SECTION DOGHOUSE RIGHT ARROW w/BACKPLATE

PEDESTRIAN COUNTDOWN

SUBMISSION LEVEL

BOSTON TRANSPORTATION DEPARTMENT

DESIGNED BY JOHN DOE
DRAWN BY JOHN DOE
CHECKED BY JOHN DOE
APPROVED BY JOHN DOE

CITY OF BOSTON TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION
TRAFFIC SIGNAL IMPROVEMENTS

SIGNAL FACE BLOCKS

DORCHESTER
INTERSECTION NUMBER 0001

AREA: –
DISTRICT: #

DATE:
DRAWING NO. XX–###
SHEET # OF #

DIRECTOR OF ENGINEERING

DRAWING PREPARED BY BOSTON TRANSPORTATION DEPARTMENT

Appendix D

MUTCD Regulatory Signs

M.U.T.C.D. REGULATORY SIGN BLOCKS

R1–1

R1–2

R2–1

R2–5a

R2–5b

R2–10a

R3–1

R3–2

R3–3

R3–4

R3–5

R3–6

R3–7

R3–8L

R3–8R

R3–9b

R3–17

R4–4

R4–7

R4–7a

R4–7b

R4–8

R4–8a

R4–9

R4–11

R5–1

R5–1b

R5–2

R5–3

R5–6

R5–9

R6–1L

R6–1R

R6–2R

R6–2L

R7–1

R7–8

R7–201

R9–3a

R9–3c

R9–8

R9–9

R9–10

R9–11aL

R9–11aR

R9–11L

R9–11R

R10–6

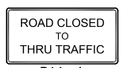
R10–7

R10–10

R10–12

R10–15

R11–2



R11–4

R12–5

R14–1

R14–2

SUBMISSION LEVEL

BOSTON TRANSPORTATION DEPARTMENT

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CHECKED BY JOHN DOE
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CITY OF BOSTON TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION
TRAFFIC SIGNAL IMPROVEMENTS

MUTCD REGULATORY SIGNS

DORCHESTER
INTERSECTION NUMBER 0001

AREA: –
DISTRICT: #

DATE:
DRAWING NO. XX–###
SHEET # OF #

DIRECTOR OF ENGINEERING

DRAWING PREPARED BY BOSTON TRANSPORTATION DEPARTMENT

Appendix E

MUTCD Warning Signs

M.U.T.C.D. WARNING SIGN BLOCKS

M4-8

M4-8a

M4-9

M4-9a

M4-9b

M4-9c

M4-10L

M4-10R

OM-1

S1-1

W1-1L

W1-1R

W1-1aL

W1-1aR

W1-2L

W1-2R

W1-2aL

W1-2aR

W1-3L

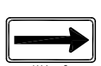
W1-3R

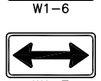
W1-4L

W1-4R

W1-5L

W1-5R


W1-6


W1-7

W1-8

W1-11

W2-1

W2-2

W3-1

W3-1a

W3-2

W3-3

W3-4

W4-1R

W4-1aR

W4-2L

W4-2R

W4-3

W4-6

W4-7L

W4-7R

W5-1

W6-1

W6-2

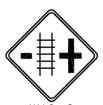
W6-3

W9-1

W9-2L

W9-2R

W10-1


W10-2

W11-1

W11-2

W11-2a

W11-10

W12-1

W14-1

W13-1

W15-1

W16-1

W16-2

W16-2a

W16-9p

W20-1

W20-2

W20-5c

W20-5L

W20-5R

W20-7a

W21-7

W20-8

SUBMISSION LEVEL

BOSTON TRANSPORTATION DEPARTMENT

DESIGNED BY JOHN DOE
DRAWN BY JOHN DOE
CHECKED BY JOHN DOE
APPROVED BY JOHN DOE

CITY OF BOSTON TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION
TRAFFIC SIGNAL IMPROVEMENTS

MUTCD WARNING SIGNS

DORCHESTER
INTERSECTION NUMBER 0001

AREA: –
DISTRICT: #

DATE:
DRAWING NO. XX–###
SHEET # OF #

DIRECTOR OF ENGINEERING

DRAWING PREPARED BY BOSTON TRANSPORTATION DEPARTMENT

Appendix F

BTD Signs

BTD SIGN BLOCKS

C-1

C-1L

C-1R

R-2R

C-2

C-3

C-4

C-5

C-6

P-1A

P-3

P-4

P-6

P-7

P-7L

P-7R

P-7a

PB-10

PB-XX

R-1

R-2L

R-3

R-4

R-5

R-6

R-7

R-8

R-9

R-10

R-12

R-13L

R-13R

R-14

R-15

R-17

R-18

R-19

R-20

R-21

R-22

R-23

R-24

R-24a

R-27

R-28

R-29

R-30

R-31

R-32

R-33

R-34

R-35

R-36

R-38

S-X

T-1

T-1a

T-1b

T-1c

T-1d

T-4

T-4a

T-4aL

T-4aR

T-4RS

T-5

T-5L

T-5R

T-6

T-6L

T-6R

T-7

T-10

T-11

T-12

T-13

T-14

T-14L

T-14R

T-15

T-16

T-17

T-18

T-19

T-23

T-23L

T-23R

T-23RS

T-23X

T-24

T-25

T-26

T-27

T-28

T-28L

T-28R

T-29

T-30

T-31

T-32

T-33

T-34

T-35

T-37

T-39

T-40

T-41

TS-1

TCP

TSEP

T-ZC

W-1

W-2

W-3

W-4

W-5

W-6

W-7

W-9

W-10

W-12

W-13

W-14

W-18

W-19

W-20

W-21

W-23

AC-##

SP-1

SP-2

SP-3

R7-107B

CWS

EV-1V

EV-1L

EV-1R

9" STREET SIGN
(LENGTH VARIES)

12" STREET SIGN
(LENGTH VARIES)

SUBMISSION LEVEL

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CITY OF BOSTON TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION
TRAFFIC SIGNAL IMPROVEMENTS

BTD SIGNS

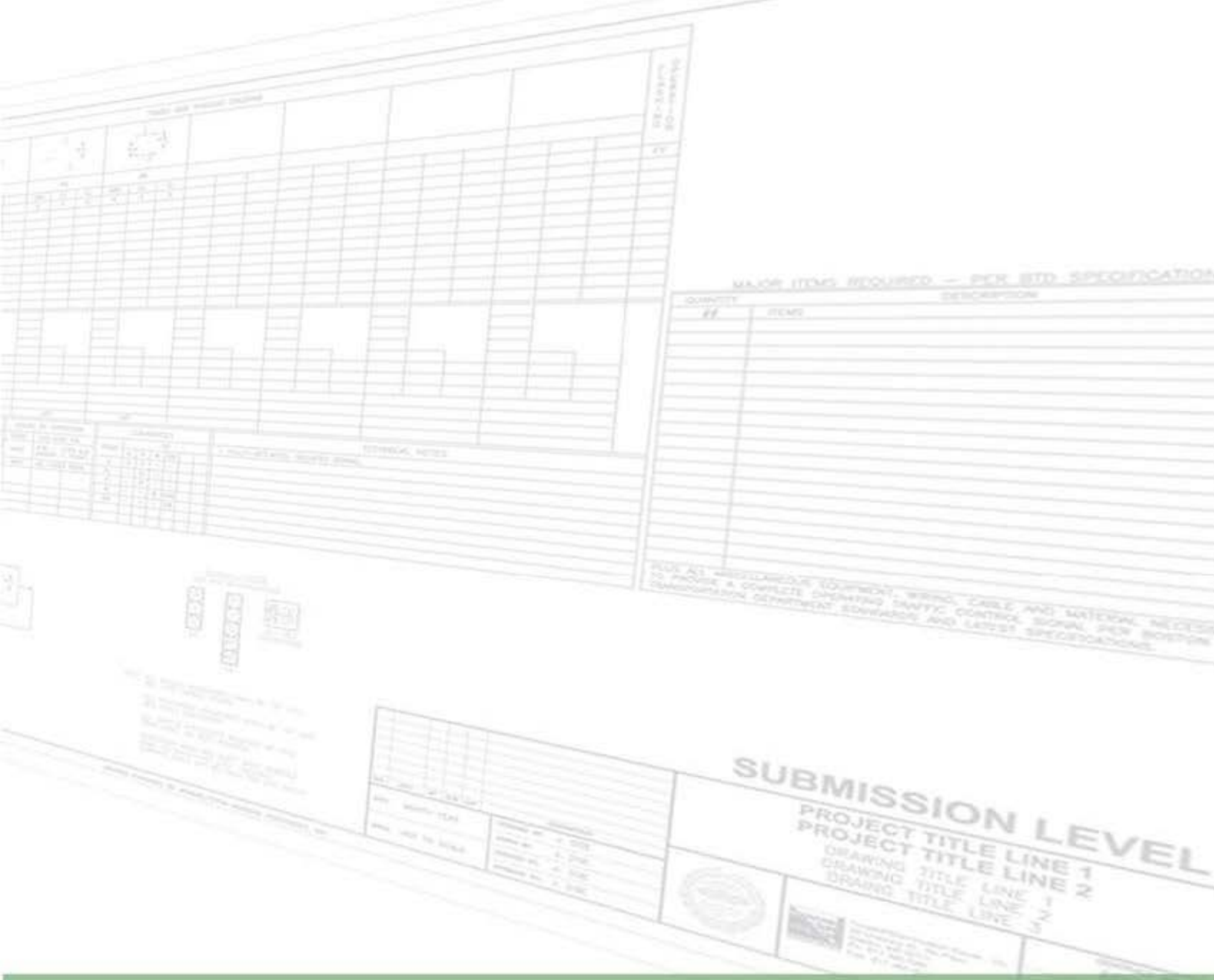
DORCHESTER
INTERSECTION NUMBER 0001

AREA: –
DISTRICT: #

DATE:
DRAWING NO. XX-###
SHEET # OF #

DIRECTOR OF ENGINEERING

DRAWING PREPARED BY BOSTON TRANSPORTATION DEPARTMENT


MAJOR ITEMS REQUIRED – PER STD SPECIFICATION
QUANTITY
ITEMS
DESCRIPTION
SUBMISSION LEVEL
PROJECT TITLE LINE 1
PROJECT TITLE LINE 2
DRAWING TITLE LINE 1
DRAWING TITLE LINE 2
DRAWING TITLE LINE 3